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ABSTRACT

This Project COPERNICUS (Cooperation Programme in Europe for Research on Nature and Industry through Coordinated University Studies) Round Table report considers efforts to identify priorities and objectives of the new alliance between the higher education community, industry, and international organizations in addressing today's environmental issues. The report provides the working documents from the Round Table, a summary of the proceedings, conclusions and recommendations from the discussions, the Round Table agenda, a list of the participants, and a selected bibliography of 87 items. Working documents include: "The Role of the Universities in Building Tomorrow's Europe" (Richard Perusse--in English and French); and "A Discussion Guide on Environmental Education and Training" (United Nations Educational, Scientific, and Cultural Organization). A summary of the introductory paper by Grzegorz Bialkowski is also provided. (GLR)

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14. *Marcel Guillaume, Georges Thill*, Formation et recherche universitaires : leurs interrelations. Unesco 1986, ED-86/WS/64.
15. Annotated Bibliography of Selected Unesco Publications and Documents relative to Training and Research.
16. Stocktaking of Needs and Resources relative to Training and Research. Volume 1: Australia, Hungary, Kenya, Syrian Arab Republic.
17. *Cesar A. Aguilar*, Análisis de las Necesidades y Recursos relativos al Adiestramiento e Investigación. Formación Superior y Desarrollo Científico en América Latina. Indicaciones preliminares sobre la integración de sistemas. Volumen 2: América Latina.
18. Inventory of Educational Research on Higher Education Problems Undertaken by Higher Education Institutions (Preliminary Version).
19. *Jagbans K. Balbir*, Aspects of Training and Research in Higher Education with Case Studies on India and Venezuela.
20. L'Enseignement supérieur et le Monde du Travail. Table ronde Unesco-Fédération internationale syndicale d'enseignement (FISE).
21. Mobilité et échanges universitaires en vue de favoriser la formation et la coopération internationales. Table ronde Unesco-Association des universités partiellement ou entièrement de langue française (AUPELF).
22. Fonctions et tâches, condition et statut du professeur d'université dans les sociétés de progrès. Table ronde Unesco-Association internationale des professeurs et maîtres de conférences des universités (IAUPL).
23. *René Ochs*, The Recognition of Studies and Diplomas of Higher Education: the Contribution of Unesco. La Reconnaissance des études et des diplômes de l'enseignement supérieur : l'apport de l'Unesco.
24. Enseignement supérieur et interdisciplinarité : problèmes et perspectives. Table ronde Unesco-Fédération internationale des universités catholiques (FIUC).
25. La Responsabilité des femmes dans la conduite de leur carrière et Enseignement supérieur. Table ronde Unesco-FIFDU.
26. *R. Lallez, C. Tahiri-Zagret, A. Robinson, L. D'Hainaut*, Perspectives de l'évolution des systèmes de formation et des pratiques pédagogiques dans le cadre de la coopération internationale. Table ronde Unesco-AIPU.
27. *Braga, Meyerson, Noguchi, Nemoto, Seratimov*, The Impact of Satellite Technology on University Teaching and Research. Unesco-IAU.
28. Higher Level Distance Education and the Needs of Developing Countries. Round Table Unesco-International Council for Distance Education (ICDE).
29. The Challenge for the University: providing education and meeting economic requirements. Round Table: Unesco-IUS.
30. Les Responsabilités internationales du professeur d'Université. Table ronde: Unesco-IAUPL.
31. Higher Education: Problems and challenges for what future? Final Report. Unesco-NGO Collective Consultation 1988.
32. Project Copernicus: Co-operation Programme in Europe for Research on Nature and Industry through Coordinated University Study. Round Table: Unesco-Standing Conference of Rectors, Presidents and Vice Chancellors of the European Universities (CRE).
33. Enseignement supérieur scientifique et technique: Nouvelles technologies de l'information et de la communication. Table ronde: Unesco-Association des Universités partiellement ou entièrement de langue française (AUPELF).

UNITED NATIONS EDUCATIONAL,
SCIENTIFIC AND CULTURAL ORGANIZATION

Project COPERNICUS

Cooperation Programme in Europe for Research on
Nature and Industry through Coordinated University Studies

Round Table

Unesco - Standing Conference of Rectors, Presidents and Vice-Chancellors
of the European Universities (CRE)

Note by the Secretariat

The present Round Table was organized by the Standing Conference of rectors, presidents and vice-chancellors of the European Universities in collaboration with Unesco and hosted by the University of Catania, Sicily.

Mrs Carin Berg, Director, Centre for Higher Education in Europe (CEPES), Ms Mary-Louise Kearney, Division of Higher Education and Training of Educational Personnel and Mr Pierre Ayala, Division of Ecological Sciences of Unesco, participated in this event.

The Secretariat wishes to thank the CRE, especially Professor Carmine Romanzi, President; Mr Andris Barblan, Secretary General and Mrs Alison de Puymege, Assistant Secretary General, and Professor Gaspare Rodolico, Rector of the Università degli Studi di Catana, for the opportunity to collaborate in this important meeting.

Note

Unesco learned with regret that Professor Grzegorz Bialkowski, Rector, University of Warsaw, passed away on 29 June 1989. His support for Project COPERNICUS and his contribution as rapporteur of the Catania Round Table were greatly appreciated.

CONTENTS

- I. Introduction
- II. Working Document: Mr Richard Perusse
Co-ordinator, Project COPERNICUS
- III. Working Documents: Unesco - A Discussion Guide on Environmental
Education and Training

Professor Grzegorz Bialkowski, Rector,
University of Warsaw, Poland - Summary of
Introductory Paper
- IV. CRE-Unesco Round Table, University of Catania
 - Conclusions and Recommendations
 - Summary of Proceedings
- V. Round Table Agenda
- VI. List of Participants
- VII. Selected Bibliography

I - Introduction

INTRODUCTION

During 1988-89 and within the framework of Programme V.5.1 "The Development and Improvement of Higher Education for the Advancement of Society", Unesco has collaborated with a group of Non-Governmental Organizations specialized in higher education to undertake a series of Round Tables. These are intended to provide reflection on key higher education issues and to propose possible orientations and suggestions for Unesco's future activities to be carried out during the Third Medium-Term Plan (1990-95). Moreover, these are designed to relate to Unesco's cooperation with NGOs.

In addition to this background, Unesco is pleased to support initiatives from NGOs which decide to design and execute specific projects in the domain of higher education. Thus, project COPERNICUS, conceived and sponsored by the Standing Conference of the rectors, presidents and vice-chancellors of the European Universities (CRE), becomes an excellent example of such cooperation between Unesco, Non-Governmental Organizations and other interested partners.

The global concern over environmental issues grows daily more serious and requires prompt and efficient collaboration amongst specialized groups which may contribute to satisfactory and long-ranging solutions. Throughout the world, these concerned parties include the higher education community, the industrial sector and international organizations. These three entities could well form a dynamic partnership, capable of providing concrete assistance to the problems at hand, notably in relation to better training, research and information exchange.

Project COPERNICUS proposes an exciting and potentially powerful alliance of these groups within the entire European region. As such a proposal merits close examination, the present Round Table aimed at bringing together a group of experts in a first effort to identify priorities and objectives which could eventually lead to a particular orientation for this initiative.

The rich discussions and the enthusiastic commitment to the concept of cooperation between universities and industry constitute an auspicious beginning which opens the way to future activity, under the aegis of the CRE and with the support of interested international organizations.



MEMORANDUM

To the Ministers of Education of the UNESCO European region concerning
recent developments in East/West inter-university cooperation

(Minedeurope IV, Paris, 21/27 September 1988)

Background

In Bucharest in 1973, the Ministers expressed the hope that the existing structures for inter-university cooperation in Europe could be expanded to include institutions from all member states. The ensuing negotiations, initiated by the rector of the University of Bologna in September 1974, proved to be unsuccessful; however, efforts were made by the Standing Conference of Rectors, Presidents and Vice-Chancellors of the European Universities (CRE), the only non-governmental inter-university organisation for the region, to pursue the dialogue and build up trust as the only basis for formal inter-university links in Europe. In this context, declarations were prepared for the CSCE Belgrade meeting (1977) and the Hamburg Scientific Forum (1978); the President of CRE took part in European seminars held in Trieste (1976) and Warsaw (1978) and attended Minedeurope III in Sofia (1980); collaboration was developed with the CEPES in Bucharest; and motions were passed by the CRE General Assemblies in Helsinki (1979) and Athens (1984) recommending renewed discussions with non-member universities.

In 1985, under the aegis of the CEPES, a consultation was held in Vienna between CRE representatives and non-affiliated rectors from Eastern countries, which gave new impetus to the dialogue. In 1987, following the Conference of socialist rectors in Moscow, the rectors of the Polish universities members of the CRE decided to invite both Eastern and Western colleagues to Poland with the aim of strengthening multilateral links between all universities in Europe.

The Warsaw Conference

From 15 - 18 June 1988, this extraordinary conference of the CRE took place in Warsaw, hosted by the University. The principal topic chosen for discussion was "The university as a melting-pot of European culture."

The main objectives of the conference were to provide an opportunity for CRE members to meet rectors from a number of universities in Eastern Europe not yet members of the CRE, to present to non-members the activities of the CRE and what it has to offer, whilst encouraging them to join the association. If the meeting proved to be successful, this would obviously have important repercussions for the future of pan-European cooperation in science and technology.

As it turned out, the goals of the conference were more than satisfactorily attained. The meeting was attended - apart from some 60 CRE members, including the Polish hosts - by over 20 rectors from the East: 5 Soviet, 3 Czech, 3 Hungarian, 8 Bulgarian and 2 East German rectors or vice-rectors took part. Although rectors from Roumania and Albania were invited, they did not come.

In Warsaw, the keynote address, delivered by the former rector of the Jagellonian University in Cracow, Professor Jozef Gierowski, was much appreciated, as were the other plenary and group sessions. The non-members took an active part in the discussions and manifested an explicit interest in CRE activities.

Besides the official sessions, the host University in Warsaw organized a series of private consultations, inviting a few non-members to discuss quite frankly with members of the CRE Bureau the possibility of universities from Eastern Europe joining the CRE in the near future. Indeed, some non-members expressed their intention to join the association within the coming months, and certainly before the bi-annual conference in Uppsala (May 1989), in order to participate in the CRE's 9th General Assembly in Durham (September 1989) as full members. Following this Assembly, another 30 - 40 universities from socialist countries would envisage joining the CRE as well. Altogether, it is hoped that about 60 universities or equivalent institutions of higher education from Eastern Europe could be affiliated.

"COPERNICUS"

Another important result of this meeting was the launching of a new idea: a CRE supported programme entitled "COPERNICUS" - Cooperation Programme in Europe for Research on Nature and Industry through Coordinated University Studies - centred on problems of environmental conservation in Europe. This programme would be characterized by the following three key words: information, education, research.

The idea was warmly welcomed by virtually all participants at the Warsaw conference, from both West and East. It was moreover stressed that environmental problems can only be solved on a European scale, and only with the help of specialists from many subject areas, e.g. biology, chemistry, physics, geography, law, engineering, sociology, economics, medicine, agriculture, etc. As specialists in all these disciplines work and meet at universities, it is quite natural that universities should play an important role in promoting a solution to ecological problems - which represent a major challenge for tomorrow's world.

This joint university, interdisciplinary programme should involve not only researchers but also professors and students from universities in all parts of the continent. The CRE, with the help of an executive board consisting of distinguished scientists and prominent industrialists, could coordinate multilateral research and exchange ventures as integral parts of the COPERNICUS programme. For this idea to materialise, the moral and financial support of governments, international organisations, industry and commerce is essential.

COPERNICUS should give new meaning to inter-university cooperation and prove that international collaboration is vital for the future of Europe.

Professor Grzegorz Bialkowski
Rector, University of Warsaw

Professor Carmine Romanzi
President of CRE

Geneva, 12 August 1988



PROJECT COPERNICUS

*Co-operation Programme in Europe for Research
on Nature and Industry through Co-ordinated University Studies*

Background

Organized academic mobility (of teaching staff, students and researchers) is not very well developed between Europeans, and this factor prompted the launching of the ERASMUS Programme by the European Community in 1987. The aim of this Programme is to reinforce the awareness of Europeans of their specificity, through the university as a place of culture.

Europe, however, is not limited to the Twelve, all the more so today as the socialist countries are contemplating renewed cooperation with the West. Furthermore, Europe shares the same problems with respect to the use of natural and human resources: elimination and recycling of waste products, urban congestion, or acid rain, for instance.

In June 1988, the rectors of both member and non-member universities of the CRE were invited by the University of Warsaw to attend a conference in Poland. On this occasion, they proposed to group these different themes into a project for the environment promoting the exchange of people and ideas throughout Europe.

This project, entitled COPERNICUS, should involve not only the universities (whose research and teaching help to situate man in his environment), but also economic leaders (whose decisions mark the influence of man on his environment). Its aim is to comprehend Europe as a complex system consisting of a network of variables affecting each and every European.

Characteristics

To attain this objective, the three traditional forms of university activity - research, teaching and information - will feature in the COPERNICUS programme. **Research** should link up the university and industrial laboratories working on related problems; **teaching** should aim to promote a global vision of the consequences of the European way of life, by grouping students according to areas of interest and focussing on the comprehension of specific issues; **information** should be directed towards key decision-makers (whether politicians, industrialists or academics) and present the effects of the various solutions to environmental problems proposed for Europe.

To ensure a comprehensive European approach, COPERNICUS should involve individuals and institutions from all over the continent and from different scientific backgrounds. The programme will thus be *trans-national* and *inter-disciplinary*.

Modalities

- Identification and development of inter-disciplinary centres connected with the environment (man confronted by and living in his natural habitat) at European universities;
- Setting up of specific networks, whether at a European level or in a particular geographical region, in the realm of both teaching and research;
- Establishment of a system of bursaries to ensure the mobility of students and researchers wishing to study a common problem in depth, be it at a university, within an industrial company, or in the framework of a joint programme;
- Presentation and evaluation of the acquired results at special seminars;
- Dissemination of the conclusions concerning Europe's development by means of conferences (bringing together politicians, industrialists and academics) convened to discuss *position papers* prepared by the various project networks.

Launching the project

- 1) Definition of the priorities for the next two or three years with regard to themes and types of activity. In this context, the University of Catania has offered to host a COPERNICUS seminar in April 1989 with about twenty participants (rectors representing CRE member institutions interested in the project, environmental specialists, and observers from international organizations);
- 2) Setting up of a small COPERNICUS Coordinating Committee, consisting of university and non-university members;
- 3) Presentation and adoption of the project outline in Durham during the 9th General Assembly of the CRE (11 - 15 September 1989);
- 4) Survey to be carried out among CRE member institutions and international organizations to identify existing environmental programmes, as well as inter-disciplinary and trans-national centres and their major preoccupations relating to the appropriate use of natural and human resources;
- 5) Project identification study based on contacts with universities, industry, and scientific associations;
- 6) Application to potential donors: governments, foundations, international organizations, industrial concerns;
- 7) Launching of one or several pilot projects (in early 1990), to be evaluated and modified in 1991/92.

Geneva, 11 November 1988

II. Working Document:

Mr Richard Perusse
Co-ordinator, Project COPERNICUS
(English and French)



PROJECT COPERNICUS

ENVIRONMENTAL EDUCATION & RESEARCH

The rôle of the universities in building tomorrow's Europe

1. Introduction

Nobody would deny that, over the last thirty years, the environment has acquired value status, nor that this new value has progressively attained one of the highest ranks in scale of values of our societies.

Its first defenders, who were not yet known as "Greens", were looked on as crackpots and cumbersome obstructors. Yet the progress which they achieved in terms of credibility rapidly led them to occupy ever more seats on local councils and in regional or national parliaments. From having denounced those in power, at every level, they often became collaborators of the same; some of them today are even Ministers - usually of the Environment !

Politicians of all tendencies generally avoid speaking about affairs which interest no-one. Recently, however, they have tended to make declaration after declaration concerning the environment, or to promote major international conferences on the same topic. For instance, in Strasbourg in January, President Delors declared that the European Community should give priority to the environment. One month later, in Tokyo, President Mitterrand announced that the Seven would concern themselves with the matter. In March this year, there has been a veritable avalanche of major international meetings on the environment: London, Paris, The Hague, and finally Basle, where an important *international treaty* concerning the limitation and control of the transport of hazardous waste was adopted.

In short, the environment as a value has become a commonplace for almost every political party the world over.

2. The role of international organizations

In the paper which she prepared for the Unesco-CRE Round Table meeting devoted to Project Copernicus, Ms Mary-Louise Kearney highlights Unesco's role over the past twenty years, since the launching of the Man and the Biosphere (MAB) Programme in 1971. The MAB

Programme has contributed in no small way to making public opinion aware of the global nature of the environmental problems facing mankind. It has stressed, on the one hand, the need to find short-term remedies for the afflictions affecting the industrial world and which are usually of the latter's own making, while emphasizing the obligation to reflect on possible long-term solutions, on the other. It is to Unesco's credit that they have managed not only to persuade people to change their attitudes and behaviour, but also to convince societies to modify their structures, systems and policies by coordinating, on an international level, joint efforts encouraging governments to abandon the short-term perspective of their own national, vested interests.

In 1972, the *United Nations* launched its *Environment Programme* (UNEP), the mandate of which is vast: agriculture, energy, development, in particular. UNEP plays a key role in preparing international conventions relating to the environment - for instance, the treaty which has just been adopted in Basle. But it also devotes 20% of its resources to training and information. *Training* is thus a "major component" of the work programme of its Industrial and Development Department, which aims to "develop a general awareness facilitating the implementation of technical guides, recommendations, guiding principles and international agreements". UNEP usually organizes its training activities in cooperation with the International Labour Organization (ILO), the World Health Organization (WHO), and other specialized agencies of the UN system.

In 1975, Unesco and UNEP launched their joint *International Environmental Education Programme* (IIEP). Two years later, at Tbilissi, it was agreed that the environment should be present in all training programmes and at all levels of the education system, including continuing and adult education programmes.

The partners of the UN and Unesco are, in the first place, governments, then non-governmental organizations of international standing, followed by public opinion reached through their information service channels. Such is the case of IIEP, for example. On a university level, however, the privileged partner of Unesco - after the various governments - is the International Association of Universities (IAU).

The IAU has made every effort to make its members aware of the need to apply the Tbilissi resolution. Its Lomé seminar (1978) focussed specifically on the environmental component of education, and part of its 7th General Conference, held in Manila in 1980, was also devoted to this topic. In 1983, the IAU organized in Budapest, in collaboration with Unesco, a seminar on "Universities and environmental education". One of the conclusions of the Budapest seminar was the following: "If winds and rivers are powerful agents of the internationalization of environmental problems, universities must themselves become powerful agents of the internationalization of *solutions* to them".

3. Universities and environmental education and research in Europe: state of the art

There is not just one Europe, there are several.

There is the Europe of the "22", of the Council of Europe, which has just announced a revitalization plan coinciding with its 40th anniversary. Its Division for Higher Education and Research is developing and managing a number of programmes involving regional university cooperation, the objective of which is to ensure the harmonization of university policies and greater mobility of students, teaching staff and researchers. The relaunching of conventions pertaining to the recognition of study periods spent abroad should also help to further this aim. It should be noted moreover that the Council of Europe has a number of Open Partial Agreements, in which non-member European countries can also take part. In the framework of its revitalization plan, the Council of Europe has thus announced that it will give priority to increased cooperation with Eastern European countries. In the short term, it is foreseen that the Soviet Union, Hungary and Poland will be invited to sign the Council of Europe's conventions relating to Culture and the Environment.

There is also the Europe of the "12" of the *European Community*, with its various institutions: the Commission, the Council of Ministers, the Parliament and the Court of Justice. These bodies control the laws and policies of the Community, and matters pertaining to the environment are given priority. The Community as such does not have any specific programme relating to environmental education.

Since 1983, its "Directorate-General XI" has nonetheless been involved in occasional vocational training activities linked to the environment. Thus, in Italy, it has set up a training programme for water purification technicians, in collaboration with the European Water Institute. Its usual method is to implement pilot projects and to promote the training of the trainers: for instance, in November 1988 it organized a seminar in Avignon in conjunction with the Chamber of Commerce and Industry of Avignon and the Vaucluse on the theme of "Teaching people how to manage the environment - a necessity".

The "Directorate-General V" ensures the link between the Community and higher education establishments. It is responsible for developing the Erasmus Programme, the aim of which is to enable thousands of students from the Community to study for a period at another university in the Community. In this context, a joint course in the field of the environment could perhaps be proposed by a network of university departments.

The "Directorate-General XII" organizes on an irregular basis Schools for environmental education, consisting of intensive training sessions for a small group of advanced students, preferably already engaged in research activities. Such Schools are organized within the framework of the environmental research programmes run by this Directorate. There are many

such programmes (see the attached list given as an annex), and many universities in Community countries already have researchers involved. As these Community programmes are financed partly by the Community and partly by the countries associated with them, researchers from universities in non-Community countries are not included.

However, the Community does not exclude the idea of cooperation with other countries: its "Directorate-General I", which coordinates Community relations with non-member countries, has as its mission, inter alia, to explore cooperation possibilities, particularly with Eastern Europe. It is nonetheless a fact that the only cooperation agreement with the socialist countries has been signed within the EMEP programme, developed jointly with the United Nations.

There is also *Eastern Europe*. According to Unesco, it is in the universities of this part of the world that the most systematic attempts have been made to integrate the environment dimension into the curriculum. As far as environmental research is concerned, a certain amount is carried out in the universities, even if the Academies of Science do most of it.

Furthermore, there is the Europe of the *European Free Trade Association* (EFTA), the members of which are almost without exception members of the Council of Europe. EFTA does not run any educational or research programmes in the field of the environment.

Finally, there is the Europe of all the countries making up the continent. Each of these States has its own policy for the environment, and most of them have as many university teaching and research policies as they have cantons, provinces, *Länder* or republics.

This mosaic of countries and groups of countries, of priorities, national policies and interests, systems of university teaching and research, constitutes the terrain on which to build - throughout the continent - inter-university links relating to the environment. This institutional fragmentation is mirrored by another type of fragmentation, that of the European scientific community.

The *International Council of Scientific Unions* (ICSU) is a body of international scientific associations, often worldwide in scope, grouped according to discipline. When their interests coincide, ICSU invites the organizations concerned to form themselves into a Committee - either scientific or special.

The *Scientific Committee on Problems of the Environment* (SCOPE), founded in 1969, is one of the nine Committees of ICSU. Its membership includes 21 international unions adhering to ICSU and 35 national research bodies which finance, manage or carry out environmental research projects. 19 of these national research bodies are European, and six of them are located in Eastern Europe. One must moreover assume that many European researchers are also members of the international scientific unions which belong to SCOPE. SCOPE maintains close links with the UNEP, with Unesco (MAB) and with the World Health Organization, which runs a research programme entitled *World Climate Programme*, but it does not supervise its own environmental research programmes. Rather, the Committee focusses on collecting and synthesizing existing information relating to environmental problems, which it then critically appraises,

summarizes and disseminates by means of thematic reports. SCOPE has thus developed its own series of scientific publications. Since 1971, 36 studies have been published and some 15 more are presently being prepared. Five other titles have appeared as joint MAB/SCOPE publications.

The *European Science Foundation* (ESF) is an association of 49 members; the latter consist of national research councils and academies of science in 18 Western European countries. The term science is to be interpreted here in the broad sense: the ESF subsidizes research not only in the natural, medical and biological sciences, but also in the humanities and the social sciences. The ESF has its own *research programmes*. It is only recently that a system of *networks* was introduced, to put European researchers working in the same fields in touch with one another, thereby facilitating their mobility throughout Europe and encouraging an interdisciplinary approach to problems. The ESF thus hopes to contribute to the building of a Europe which is a **coherent entity**, to quote the president of its Networking Committee.

Some of these programmes and networks focus on the environment, e.g. the "*Environmental Toxicology*" programme and the "*FERN - Forest Ecosystems*" network. Although the ESF is European first and foremost, it does not exclude participation in programmes which are not exclusively European. Such is the case of the *Ocean Drilling Program* (ODP) which also involves the USA, Canada and Japan. The ESF represents 12 European countries in this programme, whereas France, the Federal Republic of Germany and the United Kingdom are associated with it directly.

The European scientific community is vast. There are thousands of persons working at universities, within the academies of science and at national research centres, and in governmental, industrial or private research laboratories. Of all these persons, it is precisely those who have the dual mission of educating the younger generation by transmitting their knowledge and of developing this knowledge by pursuing research - and more specifically those who fulfill this dual mission in the realm of the environment - whom the CRE proposes to link up thanks to Project COPERNICUS.

4. Possible role to be played by the CRE in promoting environmental teaching and research at university level through Project COPERNICUS

According to its Constitution, the objective of the CRE is *the achievement and development of cooperation between the Rectors, between the Universities over whose destinies they preside, and between their teachers, research workers and students*. In the last analysis, this objective lays the foundations of all CRE activities, whatever their specific aims; the same should apply to Project COPERNICUS, whatever its characteristics - which will be decided by the appropriate CRE authorities according to the conclusions and recommendations of the Unesco-CRE Round Table meeting in Catania.

It should also be stressed that organizations such as Unesco, UNEP's Department for Industry and Development, the European Community, the Council of Europe or the ESF, all consider that CRE carries an undeniable trump card with its all-European membership and its potential role as the promoter of cooperation between universities throughout the whole of Europe. Indeed, all of these organizations are also trying to promote the enhanced mobility of students, teaching staff and researchers throughout Europe, often with more or less successful results. A convergence of efforts would thus seem to be possible between the CRE and the major governmental and non-governmental international organizations in the field of European scientific mobility.

4.1 Universities and environmental education

At Unesco and UNEP, particular importance is attached to the fact that the CRE's members represent the highest echelons of universities, namely the rectors, who are perhaps rightly considered to be the leaders of the academic communities over which they preside, and who are also looked on as an interface between their institution and the local or national authorities. As mentioned above, the latter committed themselves to setting up the International Environmental Education Programme launched jointly by the two organizations some 15 years ago. In the opinion of Unesco and UNEP, however, the process of integrating the environmental dimension into all university curricula is a very slow one.

In other words, Project COPERNICUS has evoked certain hopes at Unesco and UNEP, since it could incite universities to accelerate the process of incorporating environmental education into their different courses. It is also hoped that such a programme would encourage CRE members to pool their mutual expertise acquired over the years and consult each other in the development of other activities. A COPERNICUS network of European universities could surely contribute to the following:

- the elaboration of environmental teaching methods and approaches at a university level;
- the organization of training seminars for persons in charge of academic affairs at universities;
- the development of interdisciplinary training programmes for environmental specialists;
- the systematic evaluation of training programmes for teachers from other educational sectors;
- the development of new international "environment certificates", along the lines of the post-graduate model developed by universities in Belgium, France, Italy, Portugal, Spain and Switzerland (the *Certificat Européen en Ecologie Humaine*);

- the systematic revision of continuing and adult education programmes, with the aim of incorporating the environmental dimension.

At Unesco and UNEP, it is also hoped that the universities will examine the question of *tailor-made courses*, organized at the request of and specifically for certain groups. According to Unesco, interesting experiments have been carried out in this field in the Ukraine, for instance, where an environmental training programme was set up for members of parliament and civil servants. In a similar vein, UNEP has organized a number of training activities for groups of civil servants, industrialists and technicians, with support from the International Labour Organization (ILO) and national employers' associations, and even in collaboration with the European Institute of Business Administration at Fontainebleau (INSEAD). In this context, it is thought that the CRE could make use of its contacts with the Roundtable of European Industrialists (ERT), with whom it founded in Bologna, in September 1988, the *European University-Industry Forum*.

4.2 Universities and environmental research

If, at Unesco and UNEP or elsewhere, it is not difficult to imagine the role which a programme such as COPERNICUS could play in promoting environmental education, it is more difficult to envisage its contribution to environmental research. The European Community was quick to warn the CRE that it is much easier to persuade academics to work together on projects linked to educational matters than on research projects. In research, we were told, everybody has his or her own project.

In this area, other difficulties should also be taken into account.

Some people, who hold the CRE in high esteem, are somewhat worried by the fact that it is about to launch a programme which, at first sight and at least with regard to the research element, would seem to be overly ambitious. They fear that COPERNICUS would be too heavy a burden to carry for an association with the lightest of infrastructures. Bearing in mind these limits, the CRE can only act as a catalyst in environmental research and not aim to execute the various projects.

Others, who are responsible for running their own programmes or who contribute to programmes developed and managed by other organizations, usually NGOs, are worried by the appearance of a new protagonist on the scene. In their eyes, the latter would almost inevitably solicit their aid, and they do not see how they could satisfy the request, given that their resources are already limited. On the other hand, how could they refuse an application from the association of European universities? It will no doubt be necessary to reassure these people by stressing that the CRE is aware of the fact that resources are limited and that COPERNICUS should thus be developed by relying on what already exists or on totally new resources. Indeed, new sources of funding will obviously be needed to enable researchers who do not yet know each other to meet and exchange information, to coordinate often parallel activities, to encourage the mobility

of young research workers throughout Europe, and to draw up an inventory of existing projects in environmental research in specific fields. These additional costs, which are inevitable, should nonetheless help to make economies in the long run by pooling scarce resources and by creating new syntheses and collaborative entities - worth more than the sum of the parts.

Finally, there are those - generally NGOs - who have already proved that their programmes are serious and well-founded, who develop new projects all the time, and who are only too aware that their funding bodies - generally governmental organizations - do not have unlimited resources at their disposal. Can one blame them for viewing the arrival of the CRE on the "market" of environmental research as providing dangerous competition ? Of course, the CRE's objective is not to become involved in environmental research as an organization, and Project COPERNICUS does not aim to transform the CRE into a European centre for environmental teaching and research. Yet the possibility cannot be excluded that a research network set up within the framework of COPERNICUS might apply for a grant from the European Community or the Council of Europe, and that this network's appeal would meet with approval precisely because - all other things being equal - it had the added advantage of consisting of researchers from universities in both Western *and* Eastern Europe. At the European Community, moreover, we were told that shared financing (partly by the West, partly by the East) of a project is not impossible.

5. University-industry cooperation

The desire to involve industrial research workers and managers from all parts of Europe could be another important factor liable to contribute to the success of Project COPERNICUS, since it could endow it with a real specificity.

In the past, it was generally felt that industry did not care about environmental questions. It would nevertheless seem that this is false, and that politicians are not the only decision-makers to recognize that the environment has now acquired value status.

Last January, in Turin, the Sanpaolo Foundation, created by the major Italian bank of the same name, held an important colloquium on the environment. Still in Italy, Confindustria has recently decided to set up an Environment Committee, one of whose tasks will be to develop an *Istituto per l'Ambiente* in Milan, drawing to a large extent on the teaching and research capacities of the universities. As for the Roundtable of European Industrialists, it is in the process of constituting an Environmental Working Group under the chairmanship of P. Gyllenhammar, the Chief Executive Officer of Volvo.

6. Conclusions

After several years of effort, the CRE is now in a position to attain its basic objective: cooperation between all European universities. In this context, the theme of the environment can, by definition, render this collaboration both European and interdisciplinary. Furthermore, by working together with industry, as in the example of the European University-Industry Forum, the CRE can confer quite another dimension on the joint activities of its members.

It is for this reason that the CRE is inviting to its Roundtable meeting to be held in Sicily from 5 - 8 April 1989, organized in conjunction with Unesco with the generous support of the University of Catania, not only university representatives but also industrialists from both Western and Eastern Europe, as well as experts and representatives of major national and international organizations. They are all natural partners in a global commitment to the environment - a highly topical problem in today's world.

Bearing in mind the present fragmentation of efforts, approaches and scientific fields outlined above, the Catania meeting should put forward specific guidelines for COPERNICUS based on scientific interest areas, geographical focus, the nature of the persons and partners to be involved, and possible resources. It should also outline the programme's methods and procedures, its directing body and working groups, and suggestions for a survey to be carried out among CRE members, etc.

It is to be hoped that all the participants at this meeting in Sicily will contribute to what the Secretary for the Pontifical Council for Culture, Hervé Carrier, has termed the *civic role of universities*, which he evoked during the CRE's Athens General Assembly in 1984: "what we are primarily concerned with is to understand how the future of the university can be of most use in the building of the societies of tomorrow."

28/3/89



PROGRAMME COPERNICUS

FORMATION & RECHERCHE EN ENVIRONNEMENT

Le rôle des universités dans la construction de l'Europe de demain

1. Introduction

Personne ne niera qu'au cours des trente dernières années, l'environnement ait accédé au rang de valeur, ni que cette nouvelle valeur ait progressivement gagné, dans les échelles de valeurs de nos sociétés, l'un des tout premiers rangs.

Ses premiers défenseurs, qu'on n'appelait pas encore les *Verts*, ont d'abord été perçus comme des hurluberlus et des gêneurs. Mais les gains qu'ils ont faits en crédibilité les ont rapidement conduits à occuper de plus en plus de sièges dans les conseils municipaux et les assemblées régionales ou nationales. Ils étaient les dénonciateurs des détenteurs du pouvoir, à tous les niveaux. Ils sont souvent devenus leurs collaborateurs, et certains d'entre eux se retrouvent aujourd'hui ministres - dans la plupart des cas, de l'Environnement!

Les hommes politiques - toutes couleurs et toutes tendances confondues - évitent en général de parler de ce qui n'intéresse personne. Or, ces derniers temps, ils ont tendance à multiplier les déclarations ou à présider de grandes réunions internationales sur l'environnement. Par exemple, en janvier à Strasbourg, le Président Delors déclarait que la Communauté Européenne doit donner la priorité à l'environnement. Un mois plus tard à Tokyo, le Président Mitterrand annonçait que les Sept vont se saisir de ce dossier. En mars, c'est à une véritable avalanche de grandes réunions internationales sur l'environnement que l'on a assisté : Londres, Paris, La Haye, et pour finir Bâle, où un important *traité international* sur la limitation et le contrôle du transport des déchets dangereux a été adopté.

Bref, la valeur environnement est devenue affaire courante dans toutes les parties du monde.

2. Rôle des organisations internationales

Dans la communication qu'elle a rédigée pour les fins de la Table Ronde Unesco-CRE sur le Projet COPERNICUS, Madame Mary-Louise Kearney met en lumière le rôle de l'Unesco ces vingt dernières années depuis le lancement du programme MAB en 1971. Ce projet sur *l'Homme et la Biosphère* n'a pas peu contribué à rendre l'opinion consciente de l'envergure

planétaire des problèmes d'environnement auxquels l'humanité doit faire face. Il a souligné d'une part la nécessité de trouver à court terme des remèdes aux maux dont le monde industriel souffre généralement de par sa propre faute, d'autre part l'obligation d'une réflexion sur les solutions à envisager à long terme. Ce n'est pas le moindre mérite de l'Unesco que d'avoir réussi à persuader les personnes de modifier leurs attitudes et comportements mais aussi les sociétés de remettre en cause leurs structures, systèmes et politiques pour, au plan international, coordonner des efforts sortant de la perspective courte des intérêts et des causes des diverses nations de la planète.

En 1972, c'est l'ONU qui lance son *Programme des Nations-Unies pour l'Environnement* (PNUE). Vaste est son mandat: agriculture, énergie, développement, notamment. Le PNUE joue un rôle clé dans la préparation des conventions internationales relatives à l'environnement - par exemple, le traité qui vient d'être adopté à Bâle. Mais il consacre aussi 20% de ses ressources à la formation et à l'information. La *formation* est ainsi une "composante majeure" du programme de travail de son Département Industrie et Développement et vise à "créer une prise de conscience générale permettant de mettre en vigueur les guides techniques, les recommandations, les principes directeurs et les accords internationaux". C'est le plus souvent en collaboration avec le Bureau International du Travail (BIT), l'Organisation Mondiale de la Santé (OMS) et d'autres agences spécialisées de l'ONU que le PNUE organise ses activités de formation.

C'est ensemble que l'Unesco et le PNUE ont lancé, en 1975, leur *Programme International d'Education en Environnement* (PIEE). Deux ans plus tard, à Tbilissi, on tombait d'accord pour dire que l'environnement doit être une composante de tous les programmes de formation, à tous les niveaux des systèmes d'enseignement, ainsi que de tous les programmes de formation continue et de formation des adultes.

Les interlocuteurs de l'ONU et de l'Unesco sont d'abord les gouvernements, ensuite les ONG d'envergure internationale, enfin l'opinion publique rejointe par le canal de leurs services d'information. C'est le cas du PIEE, par exemple. Au niveau universitaire cependant, l'interlocuteur privilégié de l'Unesco reste, après les gouvernements, l'Association Internationale des Universités (AIU).

Or l'AIU n'a pas ménagé ses efforts pour sensibiliser ses membres à la nécessité d'appliquer la résolution de Tbilissi. Son Séminaire de Lomé (1978) portait précisément sur la composante environnement des programmes de formation et elle y a consacré une partie des travaux de sa septième Assemblée Générale, tenue à Manille en 1980. En 1983, elle organisait à Budapest, en collaboration avec l'Unesco, un Séminaire sur le "Rôle de l'université dans l'éducation en environnement". L'une des conclusions du Séminaire de Budapest est que "si les vents et les fleuves sont de puissants agents de l'internationalisation des problèmes d'environnement, les universités doivent devenir les agents de l'internationalisation des *solutions*".

3. Formation et recherche universitaires en environnement en Europe: état de la question

Il n'y a pas une Europe, il y en a plusieurs.

Il y a celle des "22", du *Conseil de l'Europe*, qui vient de se donner, à l'occasion de son quarantième anniversaire, un plan de revitalisation. Sa Division de l'enseignement supérieur et de la Recherche développe et gère en particulier des programmes de coopération universitaire régionale qui ont pour objectif d'assurer une harmonisation des politiques universitaires et de favoriser une plus grande mobilité des étudiants, des enseignants et des chercheurs. Ce à quoi devrait aussi conduire une relance des conventions sur la reconnaissance des périodes d'étude à l'étranger. A noter que le Conseil de l'Europe a des *Accords partiels ouverts*, auxquels des pays européens non membres du Conseil peuvent participer. Dans le cadre de son plan de revitalisation, le Conseil de l'Europe annonce ainsi qu'il donnera la priorité à l'intensification de sa collaboration avec les pays de l'Est. On prévoit qu'à court terme, l'URSS, la Hongrie et la Pologne seront invitées à adhérer à des conventions du Conseil de l'Europe dans les domaines de la Culture et de l'Environnement.

Il y a l'Europe des "12" de la *Communauté Européenne*, avec ses institutions, la Commission, le Conseil des ministres, le Parlement et la Cour de justice. Ces organes gèrent des lois et politiques communautaires dont celles consacrées à l'environnement ont une importance prioritaire. La Communauté ne propose pas de programme spécifique de formation en environnement.

Sa "Direction générale XI" s'est cependant engagée, depuis 1983, dans des activités ponctuelles de formation professionnelle (*vocational training*) en environnement. Ainsi, en Italie, elle a mis sur pied un programme de formation de techniciens en épuration des eaux, qu'elle a réalisé en collaboration avec l'Institut Européen des Eaux. Elle procède habituellement par projet-pilote et met l'accent sur la formation des formateurs comme lorsque, en collaboration avec la Chambre de Commerce et d'Industrie d'Avignon et du Vaucluse, elle organise en novembre 1988 à Avignon le Séminaire "Former pour mieux gérer l'environnement - une nécessité".

La "Direction générale V" assure la liaison entre la Communauté et les établissements d'enseignement supérieur. Elle est responsable du développement du programme Erasmus, qui a pour objectif de permettre à des milliers d'étudiants de la Communauté d'acquérir une partie de leur formation dans une autre université d'un autre pays de la Communauté - formation qui pourrait être dans le domaine de l'environnement si un réseau de départements universitaires décidait de le proposer.

La "Direction générale XII" organise de façon ponctuelle des *Ecoles* de formation en environnement. Il s'agit de sessions intensives de formation réservées à un petit nombre d'étudiants, de haut niveau, de préférence déjà engagés dans des activités de recherche. Elles relèvent des programmes de recherche en environnement gérés par cette Direction. Ces

programmes sont nombreux (on en trouvera la liste en *annexe*), et nombreuses sont aussi les universités des pays de la Communauté dont les chercheurs y sont engagés. Ces programmes communautaires étant financés, à frais partagés, par la Communauté et par les pays qui s'y associent, les chercheurs universitaires des pays non communautaires en sont totalement absents.

La Communauté n'exclut pas cependant la coopération avec des pays extérieurs : sa "Direction générale I", qui coordonne les relations de la Communauté avec les pays tiers, a pour mission, entre autres, d'explorer ces possibilités de coopération - en particulier, avec les pays de l'Est. Force est de constater que c'est seulement dans le cas du programme EMEP, développé conjointement avec l'ONU, qu'un accord de coopération a pu être conclu.

Il y a l'*Europe des pays de l'Est*. Selon l'Unesco, c'est dans les universités de ces pays qu'ont été faits les efforts les plus systématiques d'intégration de la dimension environnement dans l'ensemble des programmes de formation. Pour ce qui est de la recherche en environnement, on sait qu'il s'en fait dans les universités même si le gros de l'effort est assuré par les Académies des sciences.

Il y a l'Europe de l'*Association Européenne de Libre Echange*, l'AELE, dont les membres sont presque tous membres du Conseil de l'Europe. L'AELE n'a pas d'activités de formation ou de recherche en environnement.

Il y a enfin l'Europe de l'ensemble des pays qui la composent. Chacun de ces pays a sa politique de l'environnement, et nombre d'entre eux ont autant de politiques de formation et de recherche universitaires qu'ils ont de cantons, de provinces, de Länder ou de républiques.

Cette mosaïque de pays et de regroupements de pays, de priorités, de politiques et d'intérêts nationaux, de systèmes d'enseignement et de recherche universitaires, est le terrain sur lequel construire des liens de coopération entre les universités de toute l'Europe en matière d'environnement. Cette fragmentation institutionnelle se double d'ailleurs d'une autre, celle divisant la communauté scientifique européenne.

Le *Conseil International des Unions Scientifiques* (ICSU) regroupe sur une base disciplinaire les associations internationales scientifiques. Ces dernières sont le plus souvent d'envergure mondiale. Quand leurs centres d'intérêt convergent, ICSU invite les organismes concernés à se constituer en Comité - scientifique ou spécial.

Le *Comité Scientifique Chargé des Problèmes de l'Environnement* (SCOPE), fondé en 1969, est ainsi l'un des neuf Comités d'ICSU. Il regroupe 21 associations internationales membres du Conseil international et 35 organismes nationaux de recherche qui financent, gèrent ou réalisent des travaux de recherche en environnement. Dix-neuf de ces organismes nationaux de recherche sont européens. Six d'entre eux sont des organismes de pays d'Europe orientale. On doit par ailleurs présumer que nombre de chercheurs universitaires européens qui font de la recherche en environnement sont aussi membres des associations scientifiques internationales membres de SCOPE. SCOPE entretient des liens de collaboration avec le PNUE, avec l'Unesco (MAB) et avec l'Organisation Mondiale de la Santé, qui a un programme de recherche sur le

climat (*World Climate Programme*). Il ne gère pourtant pas de programmes de recherche en environnement comme tels. Le Comité met plutôt l'accent sur la synthèse de l'information relative aux problèmes d'environnement: il la réunit, en fait l'analyse critique, la résume et la diffuse par le biais de rapports thématiques. SCOPE a ainsi développé sa propre collection de publications scientifiques. Depuis 1971, 36 titres ont paru et une quinzaine d'autres sont en préparation. Cinq autres titres ont fait l'objet de publications conjointes MAB/SCOPE.

La *Fédération Européenne de la Science* (FES) est une association dont les 49 membres sont des conseils nationaux de recherche et des académies des sciences de 18 pays d'Europe de l'Ouest. Il faut entendre le mot science dans son sens le plus large: la FES subventionne des travaux de recherche aussi bien dans les sciences naturelles, les sciences médicales et les sciences de la vie que dans les sciences humaines et les sciences sociales. La FES a ses propres *programmes de recherche*. C'est relativement récemment qu'elle a commencé à constituer des *réseaux* mettant en relation les chercheurs européens qui oeuvrent dans les mêmes domaines, facilitant la mobilité des chercheurs dans l'espace européen et soutenant une approche interdisciplinaire des problèmes. La FES souhaite par là apporter sa contribution à la constitution d'une entité européenne qui soit *cohérente*, pour utiliser les termes du président de son Comité des réseaux.

Certains de ces programmes et réseaux ont l'environnement pour objet: c'est le cas du programme "*Environmental Toxicology*" et du réseau "*FERN - Forest Ecosystems*". Si la FES est d'abord européenne, elle n'exclut pas la participation à des programmes qui ne sont pas exclusivement européens. C'est le cas de l'ODP (*Ocean Drilling Program*) qui intéresse aussi les Etats-Unis, le Canada et le Japon. La FES y représente douze pays européens alors que la France, la République Fédérale d'Allemagne et le Royaume-Uni s'y sont associés directement.

La communauté scientifique européenne est vaste. Il s'agit de centaines de milliers de personnes qui travaillent dans des milliers d'universités, d'académies des sciences et de centres nationaux de recherche, dans des instituts et des laboratoires gouvernementaux, industriels ou privés. Parmi toutes ces personnes, ce sont celles qui ont pour double mission de former des jeunes en leur transmettant un savoir et de développer ce savoir en se livrant à des travaux de recherche, et plus précisément celles qui remplissent cette double mission dans le domaine de l'environnement que la CRE, par son programme COPERNICUS, se propose de mettre en relation de coopération.

4. **Rôle que la CRE pourra jouer, par son programme COPERNICUS, en matière de formation et de recherche universitaires en environnement**

La CRE a pour objectif, selon son statut, d'assurer et de développer en Europe la coopération entre les Recteurs, entre les Universités aux destinées desquelles ils président et entre leurs maîtres, chercheurs et étudiants. En dernière analyse, cet objectif fonde l'ensemble des activités de

la CRE, quels que soient leurs buts particuliers; il devrait en aller de même pour le programme COPERNICUS, quels qu'en soient les caractéristiques propres qui devront être décidées par les instances appropriées de l'organisation à la lumière des conclusions et recommandations de la Table Ronde Unesco-CRE de Catane.

A noter qu'à l'Unesco comme au Département Industrie et Développement du PNUE, à la Communauté Européenne, au Conseil de l'Europe ou à la FES, on considère comme un atout indiscutable de la CRE son envergure pan-européenne et le potentiel de coopération qu'elle représente pour les universités de toute l'Europe. En effet, toutes ces organisations s'efforcent aussi de favoriser la plus grande mobilité des étudiants, des enseignants et des chercheurs dans l'ensemble de l'espace européen - souvent, jusqu'ici, avec des résultats mitigés. Il y aurait donc une convergence possible des efforts de la CRE et des grandes organisations gouvernementales et non gouvernementales dans le domaine de la mobilité scientifique européenne.

4.1 Formation universitaire en environnement

A l'Unesco et au PNUE, on attache une particulière importance au fait que la CRE regroupe les universités au plus haut niveau, celui des recteurs, qu'on n'a sans doute pas tort de considérer comme les leaders des communautés universitaires qu'ils président, mais qu'on considère aussi comme un interface entre les établissements qu'ils dirigent et leurs autorités de tutelle. On rappelle que celles-ci se sont engagées en particulier à mettre en oeuvre le Programme International d'Education en Environnement lancé conjointement par les deux organisations il y aura bientôt 15 ans. A leurs yeux, l'intégration de la dimension de l'environnement dans l'ensemble des filières de formation universitaire se fait bien lentement.

C'est dire que le programme COPERNICUS suscite certains espoirs à l'Unesco et au PNUE car il pourrait inciter les universités à accélérer le processus de modification de leurs programmes en vue d'intégrer l'éducation en environnement dans toutes leurs filières de formation. On espère aussi que le programme conduira les membres de la CRE à mettre en commun l'expertise acquise au cours des années et à se concerter dans le développement d'autres activités. Un réseau COPERNICUS d'universités européennes ne pourrait-il pas contribuer :

- à l'élaboration d'une pédagogie de l'enseignement de l'environnement au niveau universitaire;
- à l'organisation de séminaires de formation destinés aux responsables des diverses structures de formation des universités;
- au développement de programmes interdisciplinaires de formation de spécialistes en environnement;
- à l'évaluation systématique des programmes de formation des enseignants des autres niveaux;

- au développement, sur le modèle du *Certificat Européen en Ecologie Humaine* (3e cycle) mis en oeuvre par des universités de Belgique, Espagne, France, Italie, Portugal et Suisse, de nouveaux certificats internationaux en environnement;

- à la révision systématique des programmes de formation continue et de formation pour adultes, pour tenir compte de la dimension de l'environnement.

A l'Unesco et au PNUE, on souhaite que les universités se penchent aussi sur la question des *formations sur mesure* qui sont organisées à la demande expresse et à l'intention exclusive de groupes particuliers. On souligne à l'UNESCO que d'intéressantes expériences ont été faites en ce domaine, par exemple en Ukraine où un programme de formation en environnement a été mis en place pour les parlementaires et les fonctionnaires de l'Etat. De son côté, le PNUE a organisé, à l'intention de groupes de fonctionnaires, d'industriels ou de techniciens, diverses activités de formation réalisées avec l'appui du Bureau International du Travail (BIT) et des associations nationales d'employeurs mais aussi, parfois, en collaboration avec l'Institut Européen d'Administration des Affaires (INSEAD) de Fontainebleau. On pense qu'en l'occurrence, la CRE pourrait mettre à profit les liens noués avec la Table Ronde des Industriels Européens (ERT), collaboration qui a conduit à la fondation, en septembre 1988 à Bologne, du *Forum européen université-industrie*.

4.2 Recherche universitaire en environnement

Si à l'Unesco, au PNUE et ailleurs, on a peu de peine à imaginer le rôle d'un programme tel que COPERNICUS en matière de formation universitaire en environnement, on envisage plus difficilement sa fonction dans le domaine de la recherche. La Communauté Européenne a tout de suite mis la CRE en garde: il est beaucoup plus facile d'amener des universitaires à coopérer dans le cas de projets relatifs à la formation que dans celui de projets de recherche. En recherche, nous a-t-on souligné, chacun à son projet.

Il faut aussi prévoir en ce domaine des difficultés d'un autre ordre.

Certains, qui ont pour la CRE de l'estime et de l'admiration, s'inquiètent de la voir se lancer dans la mise en oeuvre d'un programme qui, à première vue et du moins pour la recherche, leur paraît bien ambitieux. Ils craignent que le programme COPERNICUS ne constitue, pour une association dont l'infrastructure est très légère, un fardeau trop lourd à porter. Si la CRE est consciente de ses limites, elle n'envisagera de jouer, dans le domaine de la recherche en environnement, qu'un rôle de catalyseur et non de maître d'oeuvre.

D'autres, responsables de leurs propres programmes ou soutiens de programmes développés et gérés par d'autres organisations, généralement des ONG, s'inquiètent de voir apparaître un nouvel intervenant qui, cela leur paraît inévitable, ne manquera pas de solliciter leur aide. Comment pourront-ils donner suite à pareilles demandes, alors que leurs moyens ne suffisent déjà pas ? Par ailleurs, comment pourraient-ils opposer une fin de non-recevoir à une

demande de l'association des universités de l'Europe? Il faudra sans doute rassurer ceux-là en soulignant que la CRE est consciente de la limitation des ressources et de la nécessité de développer le programme COPERNICUS en se basant sur l'acquis ou sur des ressources nouvelles. On peut prévoir en effet qu'il faudra sans doute des ressources supplémentaires pour permettre à des chercheurs qui ne se connaissent pas encore de se rencontrer pour s'informer et coordonner des travaux souvent parallèles comme pour favoriser une meilleure mobilité des jeunes chercheurs - dans toute l'Europe -, ou pour réaliser des inventaires des travaux en cours dans tels domaines précis de la recherche en environnement. Ces coûts additionnels, inévitables, devraient permettre une certaine économie au plan global cependant en réalisant entre des forces éparses de nouvelles convergences, de nouvelles synthèses et de nouveaux ensembles dont la valeur sera supérieure à la somme des parties.

Il y a enfin ceux - généralement, des ONG - qui ont fait la preuve du sérieux de leurs travaux, dont les programmes sont solidement établis, qui développent progressivement, d'année en année, de nouveaux projets, et qui sont bien placés pour savoir que les organisations - généralement gouvernementales - qui les financent ne disposent pas de ressources inépuisables. Pourra-t-on reprocher à ces ONG de percevoir l'arrivée de la CRE sur le "marché" de la recherche en environnement comme celle d'un dangereux concurrent? Certes la CRE n'a pas pour objet de faire elle-même de la formation et de la recherche, et le programme COPERNICUS n'a pas pour but de la transformer progressivement en un centre européen de formation et de recherche en environnement. Ceci dit, on ne peut exclure la possibilité qu'un réseau de chercheurs constitué dans le cadre du programme COPERNICUS réponde à un appel d'offres lancé par la Communauté Européenne ou le Conseil de l'Europe, et que ce réseau l'emporte précisément parce que, toutes choses étant égales par ailleurs, il présente l'avantage supplémentaire d'être constitué de chercheurs universitaires de pays d'Europe de l'Ouest *et* d'Europe de l'Est. A la Communauté, on nous a dit en effet que le financement à frais partagés - partie Ouest, partie Est - d'un projet est de l'ordre du possible.

5. **Coopération université-industrie**

La volonté d'impliquer les chercheurs et responsables industriels en Europe peut représenter un atout non négligeable pour le succès du Programme COPERNICUS, lui donner une véritable spécificité.

On a longtemps cru que la question de l'environnement laissait l'industrie indifférente. Il semble bien qu'il n'en soit rien, et que les hommes politiques ne soient pas les seuls hommes de pouvoir à reconnaître que l'environnement a accédé au rang de valeur.

En janvier dernier, à Turin, la Fondation Sanpaolo, créée par la grande banque italienne du même nom, tenait un important colloque sur l'environnement. En Italie toujours, la Confindustria se dotait au même moment d'un Comité pour l'environnement dont l'une des

tâches est le développement à Milan de l'*Istituto per l'Ambiente* utilisant pour bonne part les forces de recherche et de formation des universités. De son côté, la Table Ronde des Industriels Européens constitue actuellement un Groupe de travail sur l'Environnement, que préside Monsieur Gyllenhammar, Président de Volvo.

6. Conclusions

Au terme de plusieurs années d'efforts, la CRE se trouve donc en mesure d'atteindre son objectif fondamental: la coopération de toutes les universités de l'Europe entre elles. Le thème de l'environnement peut, dans ce cadre, donner à cette collaboration un objet européen et interdisciplinaire, par définition. Par ailleurs, en s'associant aux entreprises, par exemple dans le cadre du Forum européen université-industrie, la CRE peut conférer au travail commun de ses membres une tout autre dimension.

C'est pourquoi, la CRE, en collaboration avec l'Unesco et avec l'appui généreux de l'Université de Catane, réunit du 5 au 8 avril 1989 en Sicile une Table Ronde non seulement des représentants des universités mais également des industriels de l'Ouest et de l'Est de l'Europe, des experts et des représentants de grandes organisations nationales et internationales. Ce sont les partenaires naturels d'un engagement global pour l'environnement, thème mobilisateur s'il en est actuellement.

Tenant compte de la fragmentation présente des efforts, des approches et des domaines scientifiques documentée ci-dessus, la Table Ronde de Catane devra donner au programme COPERNICUS sa spécificité en cernant ses zones d'intérêt, scientifiques notamment, ses points d'implantation, en particulier géographiques, ses publics cibles mais aussi ses partenaires et ses éventuelles ressources. Elle devra aussi esquisser les modes et procédures du programme, groupe de direction, commissions de travail, enquêtes auprès des membres, par exemple.

Il faut espérer que cette rencontre en Sicile constituera, de la part de l'ensemble de ses participants, une contribution à ce que le secrétaire de la Commission pontificale de la Culture, le père Hervé Carrier, appelle le *rôle civique des universités*, qu'il définissait, lors de l'Assemblée générale de la CRE d'Athènes en 1984, comme: "servir le plus utilement possible à la construction des sociétés de demain".

Genève, 28 mars 1989

III. Working Documents: Unesco

A Discussion Guide on Environmental
Education and Training

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Summary of Introductory Paper

UNITED NATIONS
EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION

A Discussion Guide on Environmental Education and Training

A paper prepared for the UNESCO-CRE
Round Table on Project COPERNICUS
University of Catania, Sicily,
5-8 April 1989

The purpose of this brief paper is to present a review of Unesco's current activity in the field of environmental studies and, from this standpoint, to provide some suggestions for the possible orientations of project COPERNICUS ("Cooperation Programme in Europe for Research on Nature and Industry through Coordinated University Studies"), launched by the Conference of Rectors, Presidents and Vice-Chancellors of European Universities (CRE). These orientations will be the subject of a Round Table co-organized with CRE by Unesco as part of its Round Table Series on Higher Education issues undertaken within the framework of the Collective Conference with NGOs specialized in Higher Education subjects.

I. Introduction:

The environment can be considered as the whole set of natural and social systems in which man and the other organisms live and from which they draw their sustenance. This concept embraces the natural and man-made resources and products whereby human needs are satisfied. The natural environment is made up of four interlocking systems: the atmosphere, the hydrosphere, the lithosphere and the biosphere. Even without any human interference, this set of natural elements is constantly changing; but the nature and rhythm of such change are considerably influenced by human activities. The social environment includes human groups, the material infrastructures built by man, and the production relations and institutional systems that he has devised. The social environment shows the way in which human societies have organized themselves and how they function in order to satisfy, first of all, needs relating to food, shelter, health, education and work. When, in certain societies, these basic needs have been met, man pursues more ambitious aims: drawing on his experience, the lessons that science has taught him and the tools that technology offers him, and spurred on by his thirst for progress and novelty, he has sought greater fulfilment in the twofold pursuit of intellectual and spiritual enrichment and material comfort.

It is not surprising that the study of environmental issues, a complete and far-reaching domain, should find a natural forum in the programme of Unesco. The environment, as distinct if not entirely separate from ecological problems, is a broad term embracing aspects of an eclectic nature, all of which interact to influence many facets of society. Thus, Unesco with its expertise in the fields of education, sciences, culture and communication, is in a unique position to undertake an in-depth analysis of environmental problems and their possible solution.

Moreover, Unesco, through its contacts with governmental and non-governmental bodies, is able to bring together specialists from many quarters who can confer as to how best the public at large may be sensitized to these issues and how best truly effective action may be launched to tackle the solution of environmental problems.

II. The Problem:

Today, there is a general awareness that the environment is at risk. Largely due to the media, the man in the street is familiar with problems such as acid rain, the green-house effect, near extinct wildlife, inadequate or poorly managed food production, deforestation and urban pollution. Even though the scientific and technical elements may be understood by relatively few, the economic and cultural implications for society are well documented.

As a result, there is a climate of concern and even insecurity. Nevertheless, it is perhaps more difficult to concentrate efforts to advance toward the solution of these problems.

Furthermore, as with most global issues, there is a growing realization that remedies are not going to be simple to achieve and that interdisciplinary action is required to bring about noticeable improvement. Also, the linkage between environmental and economic questions is acknowledged and responsibility is being duly attributed to those parties concerned.

Amongst the principal actors involved in this field, we find universities and industry. Natural adversaries or natural partners? Today the latter description must hold true but, as yet, the linkages established to permit collaboration on the solution of environmental issues has not proved totally adequate. Such cooperation implies a mutual recognition of the elements involved: educational, scientific, cultural, economic and societal.

The objective of Project COPERNICUS would appear to be extremely timely. The promotion of dialogue and concrete cooperation on environmental matters between the academic community and industrial sector must constitute a potentially powerful instrument capable of effecting useful action in the ongoing fight against environmental deterioration. On one hand, universities are in a position to provide a comprehensive study of the problems identified through interdisciplinary research. In addition, the social and educational missions of higher education require that emphasis be placed on aspects such as sensitization and comparative analysis which serve to reveal the complexity of the problems identified and their interface with other domains. For its part, industry through its role in the productive sector, understands the interaction between economic activity and the environment. While scientific and technological progress are inherently good and result in improved social and economic conditions, there is sometimes a high price to be paid in terms of the ecological environment. Thus, each partner has a responsibility to cooperate by pooling scholarship and expertise in order to study a problem of global proportions and which could have potentially disastrous consequences for mankind.

III. Unesco's Programme:

As might be expected, the pivotal points of Unesco's activity are the Education and Science Sectors both of which have launched programmes to deal with environmental issues. It is important to recognize the specificity of each:

- the programme in education focusses on policy, curriculum training and research with a view to developing awareness of the environmental dimension;
- in the scientific fields including biology, geology, the earth and water sciences and technology, the emphasis is placed on the identification of specific environmental problems and on the cooperation efforts needed to bring about effective solutions.

Taken together, these approaches thus form a coherent unity based on awareness and action.

Since proper education on environmental problems can serve to increase awareness and prevent actual damage, particular mention should be made of the following Unesco programmes and activities:

- the International Environmental Education Programme;
- universities and environmental education;
- programmes of the Science Sector.

The International Environmental Education Programme is a cooperative response at the international level to the pressing concern of nations about their threatened or already damaged environments. Specifically, in 1975, Unesco and the United Nations Environment Programme (UNEP) jointly reacted to Recommendation 96 of the UN Conference on the Human Environment, Stockholm, 1972, after long consultative preparation, by launching the International EE Programme.

Environmental education was included among the objectives of Unesco's first Medium-Term Plan for 1977-1982. At present environmental education is an integral part of Unesco's second Medium-Term Plan for 1984-1989. Unesco's third Medium-Term Plan for 1990-1995 (draft) gives high priority to Environmental Education and Information as a Special Project with the purpose to provide wider knowledge and information about environmental issues and so develop awareness, constructive attitudes and a sense of commitment towards the protection and improvement of the environment....through the provision of scientific information and education and the popularization of environmental issues, with emphasis on the interdisciplinary character and problem-solving approach of environmental education and information in both formal and non-formal education. Furthermore, the third Medium-Term Plan taking into account the achievements of past and current activities of the International Environmental Education Programme, as well as those of the relevant activities of

Unesco's scientific intergovernmental programmes, has given priority to the development of environmental education as part of basic education, including literacy and post-literacy education, for young people and adults alike, as well as primary education and secondary general, technical, vocational and higher education. The above special project will be implemented in close cooperation with the United Nations Environment Programme (UNEP), United Nations agencies and governmental and nongovernmental organizations, and within the context of the United Nations System-Wide Medium-Term Environmental Plan.

IIEP, which celebrated its tenth anniversary in 1985 has no closing date: there is no end to efforts to preserve and improve the environment for generations to come.

The last half of the twentieth century witnessed unprecedented economic growth and technological progress. It also witnessed accompanying environmental consequences. In a sense this is not new. Interaction between people and their environment has existed since human being first appeared on earth. But never has the impact been as deep and wide; it now spans the world, affecting flora and fauna, air, soil and water, thus the quality of human life.

The interaction of humanity and the environment is an intrinsic aspect of human development. Few would wish to stop that development; all would wish it knowledgeable and intelligent, equitable and environmentally sustainable. The technology which brings pollution in its wake can provide the means for the control - indeed the elimination of - the environmental degradation once considered the inevitable price of industrial progress.

The role of education in replying to the challenges of environmental problems and disturbances impressed firmly in our social thinking, the key to their solution is already in our hands - environmental education and training.

Accordingly, the goals of environmental education are:*

- to foster clear awareness of, and concern about economic, social, political and ecological interdependence in urban and rural areas;
- to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment;
- to create new patterns of behaviour of individuals, groups and society as a whole towards the environment;

(*See: Intergovernmental Conference on Environmental Education: Unesco-UNEP, Tbilisi, 1977).

The objectives of environmental education are:

- Awareness: to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.
- Knowledge: to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.
- Attitudes: to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.
- Skills: to help social groups and individuals acquire the skills for identifying and solving environmental problems.
- Participation: to provide social groups and individuals with an opportunity to be actively and responsibly involved at all levels in working towards resolution of environmental problems.

As for guiding principles, environmental education should:

- consider the environment in its totality - natural and constructed, technological and social (economic, political, cultural-historical, moral, esthetic);
- be a continuous lifelong process, beginning at the pre-school level and continuing through all formal and nonformal stages;
- be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective;
- examine major environmental issues from local, national, regional and international points of view so that students receive insights into environmental conditions in other geographical areas;
- focus on current and potential environmental situations while taking into account the historical perspective;
- promote the value and necessity of local, national and international cooperation in the prevention and solution of environmental problems;
- explicitly consider environmental aspects in plans for development and growth;

- enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;
- relate environmental sensitivity, knowledge, problem-solving skills and values clarification to every age, but with special emphasis on environmental sensitivity to the learner's own community in early years;
- help learners discover the symptoms and real causes of environmental problems;
- emphasize the complexity of environmental problems and thus the need to develop critical thinking and problem-solving skills;
- utilize diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first-hand experience.

As recommended by the Tbilisi Conference, environmental education should be directed to:

- the general public at every age and at all levels of formal education, for pupils, students and teachers, and in the various nonformal education activities for young people and adults;
- specific occupational or social groups with a focus on those whose activity and influence have an important bearing on the environment, for instance engineers, architects, administrators and planners, industrialists, trade unionists, policy-makers and agriculturalists. Various levels in formal and nonformal education should contribute to this training. It is important, moreover, that the training of certain professionals and scientists involved with problems of the environment, such as biologists, hydrologists, sanitary engineers, et al, include an interdisciplinary environment component.

Some milestone activities have included the following:

With regard to the first category the results of action taken under the Unesco-UNEP International Environmental Education Programme (IEEP) may be appreciated in three complementary areas. First, this action has contributed to widespread awareness of the need for environmental education. The first steps to promote such awareness were taken in the early days of IEEP in 1975. It was also of assistance in the formulation of concepts and the working out of methodological approaches in this field, which was the main task during the period 1978-1980. Lastly, it facilitated the incorporation of an environmental dimension into the

educational processes of Member States. Such are the three main permanent functions of this Programme. (Detailed information concerning IEEP action during the period 1975-1986 will be found in the reference document entitled Unesco-UNEP International Environmental Education Programme (1975-1987).

Among the IEEP activities that have contributed most to international awareness of environmental education, mention should be made of a series of international and regional meetings which culminated in the intergovernmental conference at Tbilisi.

A policy of regularly supplying information has also done much to develop international awareness concerning environmental education. The IEEP newsletter *Connect*, which is published in five languages (Arabic, English, French, Russian and Spanish), has some 13,000 individual and institutional subscribers in the five regions of the world actively involved in the promotion and development of environmental education and training. Mention should also be made of the Unesco journal 'Nature and Resources' which publishes scientific articles and information concerning environmental management and the rational use and conservation of natural resources. It appears every three months in five languages (English, Chinese, French, Russian and Spanish) and has a circulation of 23,500. It aims to help inform specialists and the public at large about environmental problems and, in particular, about the activities carried out by Unesco within the framework of the Man and the Biosphere Programme (MAB), the International Hydrological Programme (IHP), the International Geological Correlation Programme (IGCP) and the programmes relating to the marine sciences.

Mention should also be made in this connection of the development, in the context of IEEP, of a computerized information system in the field of environmental education. This system consists of a set of six data bases which are regularly updated. The system is managed by the CDS/ISIS software developed by Unesco and considered to be a model for the management of data bases within the United Nations system. The data bases existing at present concern: (i) individuals active in the field of EE (some 10,000 persons belonging to 162 countries); (ii) institutions chosen by virtue of their activities in respect of EE (to date, 650 institutions established in more than 70 countries throughout the world); (iii) projects, programmes and activities in the field

of EE (more than 300 registers); (iv) an annotated bibliography of works relating to EE, in English and French (320 titles); (v) a bibliography of periodicals concerning the field of EE, in English, French and Spanish (200 titles); (vi) the articles published in *Connect* over the past two years. The UNESCO information system provides also access to all the publications (books, documents, reports of meetings, etc.,) prepared by Unesco in the context of its intergovernmental scientific programmes relating to the environment (MAB, IHP, IGCP) and its other fields of competence. Within the framework of its future activities, IEEP is planning gradually to provide remote access to the information system in question so as to place its potential at the disposal of all interested parties.

Another important aspect of progress in environmental education at the international, regional and national levels has been the development of the concepts that characterize it and of its own methodology. Since 1977, and following on from the Tbilisi Conference, a vast effort has been made both internationally and nationally to arrive at a more precise definition of the content of environmental education and of the methods by which to promote its development. IEEP's contribution has taken the form in particular of studies and the organization of seminars, research and experimental projects, as a result of which it has been made clear that environmental education should be a dimension of all subjects and areas of education taking into account both the social and the natural aspects of the human environment. Emphasis has therefore been placed on the interdisciplinary nature of environmental education, and also on the need to reach all categories of the population through in-school and out-of-school education.

IEEP action has also contributed to efforts to introduce

an environmental dimension into the educational practices of Member States. For example, inter-institutional committees have been set up by countries in all regions in the wake of regional conferences and national training courses or pilot projects undertaken or supported within the framework of IEEP in order to foster the incorporation of general environmental education into education systems, both in and out of school.

There have been two particularly important aspects to IEEP's contribution, namely, the development of education content, methods and materials and training of educational personnel.

With regard to training of educational personnel a series of international, regional and subregional training seminars designed to foster greater awareness of the issue among educational administrators, teacher educators and curriculum developers has been organized since 1979. These seminars have dealt notably with the formulation of national environmental education policies, methods of pre- and in-service teacher training, and guidelines for the preparation of educational materials. Teacher-training courses and pilot projects designed to train personnel in the environmental field have also been organized at the national level, within the framework or with the support of IEEP.

As regards the development of content, methods and materials for environmental education, IEEP has conducted a series of research activities, culminating in the production of a coherent body of teaching materials, comprising methodological guides, thematic

modules and textbooks for use in general education and in pre- and in-service teacher training. This material has been published in Arabic, English, French and Spanish, in the "Environmental Education" series, which comprises to date more than 25 titles. It is also worth mentioning, in this context, the series of posters and slides, entitled "Ecology in Action", which has been produced in more than ten languages under the MAB programme. Lastly, pilot projects carried out within the framework of IEEP in numerous countries have served not only to mobilize the national institutions concerned with environmental education, but also to train groups of educators at the national level and to develop educational content and materials suited to local conditions.

In addition to its role as a catalyst in the development of environmental education at the national level, IEEP also has a **multiplier effect at the international level**. From its inception, IEEP sought to establish co-operative relations with the institutions of the United Nations system, and also with other intergovernmental and non-governmental organizations involved in environmental education. Formal and informal meetings have been held for this purpose. Today, a growing number of international, regional and subregional organizations have made environmental education a major component of their programmes of action. *

*Unesco-UNEP Congress - Environmental Education and Training, Moscow, 1987, pages 2 and 3.

Universities and Environmental Education:

In 1983, a meeting took place at the Eotvos Lorand University, Budapest, on the theme of "The Role of the University in Environmental Education". Co-organized by Unesco and the International Association of Universities, this event constituted a sequel to the 1977 Tbilisi Conference and to IAU's own work in this domain, notably its Lomé Seminar (1978) and its Seventh General Conference, held in Manila in 1980.

The background paper, prepared by Dr. D.J. Kuenen, former Rector of the University of Leiden, the Netherlands, pointed out that the interpretation of the term "environment" can be both physical and social. Moreover, he emphasized the obligation of universities to address environmental issues and to cooperate on an international basis so as to include this discussion in university teaching and research. The participants in the meeting presented papers which covered the following topics:

- the university and the concept of environmental education;
- the context of university teachers in this subject;
- an integrated teaching approach;
- the staff and methods required;
- environmental education and life-long education.

The Seminar proposed, inter alia that "Man and the World" should be the principal concern of education. Thus, this meeting was seen as a first step to promote initiatives which might strengthen interuniversity cooperation on the national, regional and international levels in this area of environmental education.

Programmes of the Science Sector:

As a complement to the educational perspective, the scientific programmes of Unesco tackle specific problems related to environmental deterioration.

Spearheading the thrust is the celebrated "Man and the Biosphere" programme launched in 1971.

The Man and the Biosphere (MAB) Programme is an international programme of research, training, demonstration and information diffusion, launched by Unesco in the early 1970s. An integral part of Unesco's broader programme on the human environment and terrestrial and marine resources, its objective is to provide the scientific basis and the trained personnel needed to deal with problems relating to resource use, conservation and human settlements. Using an integrated, global and interdisciplinary approach, its principal aims is the proper management of the biosphere, which is man's life-support system.

The specific objectives of the Programme are:

- To identify and assess the changes within ecosystems resulting from man's activities and the effects of these changes on man.
- To study and compare the structure, functioning and dynamics of natural, modified and managed ecosystems.
- To study and compare the dynamic inter-relationships between "natural" ecosystems and socio-economic processes and especially the impact of changes in human populations, settlement patterns and technology on the future viability of these systems.
- To establish scientific criteria to serve as a basis for rational management of natural resources.
- To establish standard methods for acquiring and processing environmental data.
- To promote the development of simulation and other techniques of prediction as practical tools for environmental management.
- To promote environmental education in its broadest sense and encourage the idea of man's responsibility for and personal fulfilment in partnership with nature.

The MAB Programme consists of the following international project areas:

- the main ecological systems and physiological units;
- tropical forests;
- Mediterranean-type and temperate forests;
- grazing lands (savanna, grasslands, etc.);
- arid and semi-arid zones;
- lakes, marshes, rivers, deltas, estuaries and coastal zones;
- mountain and tundra lands;
- island ecosystems.

Man-made as opposed to natural ecosystems and man's use or abuse of energy are also covered as are four major fields of human activity or interaction with the biosphere:

- conservation of natural areas;
- effects of pesticides and fertilizers;
- major engineering works;
- genetic and demographic changes.

The MAB Programme is controlled by an International Co-ordinating Council formed of representatives of thirty countries, elected by the hundred and fifty or so Member States of Unesco, sitting together with representatives of the United Nations organizations concerned ----- Unesco, the United Nations Environment Programme (UNEP), the Food and Agriculture Organization (FAO), the World Health Organization (WHO) and the World Meteorological Organization (WMO)-----as well as representatives of the International Union for the Conservation of Nature and Natural Resources (IUCN) and the world scientific community as represented by the International Council of Scientific Unions (ICSU).

Unesco's role is to stimulate and co-ordinate research and to provide organizational support to the teams of specialists carrying out MAB projects throughout the world.

Within the same perspective of tackling specific science-based issues, research and training have focused on many areas, inter alia, the following can be cited:

- Unesco held an international symposium on University-Industry Interactions in Chemistry in Toronto, Canada, in December 1978.
- International post-graduate courses are conducted by Unesco in collaboration with UNEP on ecological approaches to resources development and land management.
- An international symposium on geological mapping in the service of environmental planning took place in Trondheim, Norway in May 1986; this was sponsored by Unesco, the Norwegian Ministry for Environment and the Geological Survey of Norway.
- A joint Unesco-UNEP Programme of international training courses on geological aspects of environmental problems has been set up.
- Research has been carried out on topics such as the role of the geosciences in the environment, notably the protection of the lithosphere, and the geoenvironment and waste disposal.

Extensive training and research activities related to particular environmental issues will be undertaken by the Science Sector during the Third Medium-Term Plan (1990-95).

III. Conclusion:

The present meeting has as its purpose the exchange of views between two groups vitally concerned with environmental education in order to identify future collaboration. Moreover, the participation of Inter-Governmental and Non-Governmental Organizations witnesses their interest and desire to support this important initiative.

That university-industry cooperation on environmental issues is both necessary and desirable is not in question. What remains to be decided is

the specific orientation of such cooperation and its practical modalities so as to achieve concrete results. To this end, discussion will no doubt focus not only on particular environmental topics but also on the instruments necessary for their analysis, namely, awareness, knowledge and know-how, attitudes, skills and the involvement of certain groups in the implementation of the activities.

Clearly, Project COPERNICUS has a role to play in the areas of regional and international cooperation related to environmental issues. Thus, the definition of its mission, content and strategies should be the first step towards the establishment of a dynamic and pertinent programme geared to the needs of society.

The CRE, already a long-established and esteemed partner of Unesco, is to be congratulated on the creation of Project COPERNICUS. It may count on the full cooperation and support of Unesco in the development and execution of the project's mandate.



COPERNICUS: Catania, April 89

SUMMARY OF PROFESSOR BIALKOWSKI'S INTRODUCTORY PAPER

Today's ecological problems can be presented in the form of three concentric circles. The innermost circle depicts the purely pragmatic side of environmental problems; the second circle is concerned with the quality of human life; whereas the outermost circle reflects our human, moral responsibility for the world which surrounds us. Although the hope is sometimes expressed that ecological problems will evaporate with the development of modern, cleaner technology, this hope is, to a great extent, illusory: we are far from understanding all the intricacies involved in problems relating to the environment.

When promoting the development of CRE activities in the light of pan-European inter-university cooperation, it is vital to find a topic which can be equally important for all members and potential members. That is why the new *Copernicus* project focusses on ecological problems which are not only scientifically interesting, but which are extremely important and require cooperation on a continental scale. The three components of *Copernicus* should be research (organized cooperation on a regional scale, sharing of expensive equipment), education (increased knowledge for environmental training), and information (improved data flow). The project should be multidisciplinary in nature, taking into account psychological factors as well as physical ones in a concerted effort to preserve the landscape. And it is surely at the university that most - if not all - the various fields of research and educational activity meet.

One of the project's main features should be "teaching the teachers", with an aim to developing a sense of mutual understanding between the traditional disciplines rather than trying to create a multi-specialist with little real competence in any scientific field. Emphasis should thus be placed on a broad educational programme for the environment, over and beyond a basic training in a particular field.

Moreover, Europe should be looked on as a region, in which environmental problems should be understood globally but cured locally. In Europe, we share similar climatic conditions, the same culture, the same rivers and seas, the same air. Our common heritage should thus be saved by a common effort. In the framework of *Copernicus*, however, we must be careful not to duplicate other programmes and initiatives, i.e. we must begin by acquiring information about existing programmes and find our "niche" amongst them.

The importance of *Copernicus* is linked to the notion of the three concentric circles, mentioned above: hence its **practical** applications (1); its **scientific** contribution (2); and its **political** implications (3).

As far as (1) is concerned, we must further not only fundamental but also applied research in favour of practical solutions; as for (2), *Copernicus* should involve some of the most advanced and most interesting techniques of modern science; finally, with respect to (3), *Copernicus* is a pan-European initiative backed by a non-governmental, university organization, and one which could develop into an exemplary field of cooperation between all European countries; not only will the welfare of all European citizens be improved, but also their mobility across boundaries will enhance mutual understanding and trust between the peoples of Europe.

The initial programme for *Copernicus* must be eminently practical. We must identify possible projects (whether based on geographical or thematic criteria) and set up working groups to discuss the specific problems linked to the project areas. CRE could perhaps begin by organizing a series of symposia focussing on ways of teaching an awareness of ecological problems. This could be a first step towards changing fundamental attitudes.

IV. Conclusions and Recommendations:

Professor Grzegorz Bialkowski
Rector, University of Warsaw,
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Summary of Proceedings:

CRE-Unesco Round Table, University of
Catania



COPERNICUS: CATANIA MEETING

CONCLUSIONS AND RECOMMENDATIONS

by Prof. G. Bialkowski,
Rector, University of Warsaw

Let me begin with some general remarks. It has become clear to everybody present in this room that the problems which could be of relevance to the Copernicus programme have been the subject of profound analysis and coordinated research for more than twenty years. Indeed, there exist numerous international organizations and programmes dealing with the environment, and I should like to mention in particular UNESCO, UNEP and SCOPE (Scientific Committee on Problems of the Environment). We were fortunate to have here amongst us representatives from both organizations, and they have provided us with a lot of relevant information. Existing programmes are frequently based on international cooperation, and Eastern Europe is also included. Furthermore, concerted efforts have been made to improve environmental education at all levels of schooling.

It has been clearly indicated, however, that the practical results of all these efforts to promote the preservation of the environment are not very considerable. There are numerous factors counteracting such efforts. One could quote here, for example:

- a) demographic factors
- b) economic factors mainly in the developing countries
- c) the global character of the problem
- d) the complexity of the problem
- e) psychological factors expressed in the lack of sufficient knowledge and pro-environmental attitudes, which follow mainly from a distorted hierarchy of moral values.

It is clear that the Copernicus programme cannot hope to become a decisive factor in finding solutions to all these problems. We are nonetheless convinced that it is our moral obligation to contribute to the search for solutions. We feel that, as long as there exists a chance of increasing our efforts in promoting better research and more effective teaching in the environmental sciences and of strengthening social pressure on the decision-makers in the domain of environmental protection, we would never be forgiven if we did not do everything in our power to attain this end. I believe this is the first - and perhaps the most important - conclusion reached at our meeting.

As we have seen, the game is played between politicians, industrial science (including the environmental sciences) and the pro-environment oriented part of society. The latter is relatively new as a pressure group and expressed in a most evident way by the Green movements, which are full of determination but which generally require some scientific background to support their activity. We are naturally aware of the fact that the position of the environmental sciences is not very good. We have thus been asking ourselves: What is the status of those sciences ? Is it a question of developing one well defined science or rather of forging a meeting place for numerous different sciences ? The majority of us clearly adhered to the second point of view. We should, however, be perfectly aware of the hindering role this very factor plays in the normal development of those sciences and the academic career of the environmentalists. Somehow, the specialists of other disciplines do not appreciate the greatest merit of the environmental sciences: namely, the systematic analysis of a very complex situation and an overall, integrating approach to the problem.

We have learned that the industrialists are becoming increasingly aware of the fact that pollution is harmful also from the point of view of industry itself. Modern industry ever more frequently needs pure materials, clean air and clean water. We are happy to have heard the representatives of industry state that they wish to cooperate with the scientists in solving theoretically existing problems and in applying them in practice. Of course, as we have seen, barriers between science and industry certainly exist. These barriers include the departmental structure of science organization, the different motivation for approaching the problem in the first place, and the existing separation between pure research and technology. But such barriers must be overcome, and one of the tasks of the Copernicus programme should be to bring together industry and science for the mutual benefit of both.

It has also been pointed out that the scientists are very frequently called upon for advice and expertise and that, in this way, they might more effectively put pressure on the policy makers by presenting solutions to the existing economic, demographical and political dilemmas which are acceptable from the point of view of environmental protection.

We have come to the conclusion that the present picture as a whole is rather bleak. What, then, can we "Copernicus people" do to make this picture somewhat brighter ? If we decide that the Copernicus programme is worth launching, we must clearly see our means and our limitations. It has been stressed here that we should project different kinds of action corresponding to different time scales. In particular, it has been suggested that we could obtain concrete results quite soon in the domain of education and information, whereas the results in the research field will only come later. This, however, does not mean that we should postpone thinking about the research component of our programme to a distant future. Such research should already be planned and undertaken.

One of the major concerns of all those present was that we should not duplicate work which is already going on, nor try to cover every aspect of the problem. We should rather focus on two or three very concrete problems to be dealt with in the immediate future and only gradually expand our activities.

It has been underlined many times that our programme should provide a meeting place for people working on the same or similar problems and who sometimes do not know about each other. Thus, our action in the realm of information should be to locate such people and help them to establish mutual contacts. Consequently, our first initiative should be to organize, starting in 1990, summer schools in certain selected areas. This type of school would provide courses for young adepts of the environmental sciences who are ready to tackle concrete problems and also group the specialists - as lecturers - in one place for a period of 2-3 weeks, thereby providing an opportunity for mutual contact and frank discussion. This might, indeed, serve as the basis for their future cooperation.

Our second initiative should be to promote the adoption of European environmental curricula. The best way to proceed would most probably be to organize in the coming year a small conference of specialists in the fields to be covered (e.g. environmental law, environmental economics, environmental health) in order to establish the general framework of such curricula. This conference could be followed by an invitation to smaller groups of 4-6 specialists to spend a semester at one of the universities involved in the programme to work out a detailed version of a specific curriculum.

As a third step, we should try to create an honorary label of "European textbook on the environmental sciences" to be awarded by a board of specialists to those textbooks which are the most appropriate and which best fit our environmental curricula.

Fourth, we should organize schools and summer courses for European industrialists. This initiative would not only bring industry and academia into closer contact, but might also provide the Copernicus programme with funds, which are obviously needed for our various activities.

Fifth, we should try to find a way of acting on the imagination and morals of a broader European public. Perhaps a series of popular lectures by specialists in the field of the environmental sciences, known as the "Copernicus lectures", could be organized and then published.

Sixth, we should locate research areas which are not yet sufficiently exploited by others. These might include the economic, legal or medical aspects of environmental protection seen from a general European viewpoint. In such cases we should set up study groups to launch the discussion on those subjects, with the aim of developing common ideas and approaches for future research.

Seventh, as has already been pointed out, we should identify specific problems which are both urgent and concrete in order to stimulate research in those fields. Some possible choices have been mentioned here based on geographical criteria (e.g. the pollution of the Baltic Sea or the Danube basin) or thematic criteria (e.g. personal transport in urban conglomerations). I believe that other problems will be soon proposed.

In order to put into practice the above projects and initiatives we will need: a) some money and b) a coordinating committee. Furthermore, it is obvious that the CRE will have additional administrative work to carry out and that somebody should be appointed for that purpose. Some money will be also needed for travel expenses, conferences, opinions from referees, etc.

The coordinating committee should consist of 6-9 people from different parts of the continent who would be really devoted to the programme and eager to offer their time and additional effort. This committee should be convened in the not too distant future, perhaps even this spring, to decide on the first actions to be undertaken.

At the end of my remarks I should like to say how deeply I am indebted, as indeed we all are, to Catania University, and in particular to its rector, Prof. Rodolico, for his most generous hospitality. Without his help, this meeting would not have been as successful as, I believe, has been the case.



PROJECT COPERNICUS

Summary record of the Unesco-CRE Round Table Meeting

University of Catania, 5 - 8 April 1989

The agenda of the Catania meeting was very full: in two and a half days of discussion, the various points of view of academics, environmentalists, industrialists, government representatives and staff members of international organizations were voiced. The following short report does not pretend to do justice to the wealth of opinions exchanged among the participants, but merely to summarize the main elements emerging for the outline of a future **Copernicus** programme.

A partnership between universities, industry and governments in the realm of the environment necessarily implies a number of *problems and obstacles* to be overcome, particularly when this partnership spans the whole of Europe, both East and West. These obstacles are often of a bureaucratic rather than a scientific or financial nature, and the division of Europe into two political blocs complicates even further the procedures and mechanisms.

This institutional inadequacy (which can be summed up by structural sclerosis, a lack of adaptability to rapid change, and built-in inefficiency) is aggravated by the fact that environmental research is dominated by single disciplines and hence the whole notion of inter-connectedness is only too often ignored. But the concept of the environment cannot be limited to ecology, nor to the "natural" environment confronted by the effects of industrial development; it also has economic repercussions, is closely interwoven with problems linked to the social sciences and the humanities, and calls for a global approach. However, not all the partners are aware of the globalization of most phenomena in today's world, nor of their unprecedented scale of change in time and space; they are sometimes blind to the fact that local elements are increasingly affected by global parts of the system, while the consequences of global development are ever more localized.

To remedy this state of affairs and remove the existing barriers, it is proposed:

- to reinforce the concept of problem-orientation in the academic world and to set up inter-disciplinary networks;
- to develop a mutual sense of urgency and inter-dependence concerning environmental issues;
- to promote an understanding of the mechanisms and constraints involved in the various partners' decision-making processes;
- to encourage an awareness of each partner's mental inertia in the face of change and develop their capacity for change.

In other words, we must convert the problem into an opportunity.

*The conditions for the success of a programme such as **Copernicus** should be taken into account at the outset. CRE, as the initiator of the project, must therefore:*

- be aware of the game to be played and the nature of the playing field;
- distinguish between good intentions and real results;
- uphold the identity of universities, which are unique because of their humanistic background;
- avoid duplicating activities carried out by others;
- act as a catalyst, by reflecting, stimulating and bringing together expertise;
- be realistic (which means narrowing targets rapidly);
- establish networks and organize centres of excellence, to be consulted by governments and industry for specific problems;
- encourage inter-disciplinarity, but limit it to only a few subject areas for the sake of efficiency;
- differentiate between short-term and long-term results and goals (i.e., the respective emphasis to be placed on training and research);
- constitute a feedback mechanism for the authorities (both national and international);
- play an active role as a broker in negotiations between industry and government;
- develop a viable university-industry interface, focussing on the development of new values.

The following *themes and activities* for Copernicus were recommended by the participants:

- a survey of European universities to ascertain what is presently going on in environmental education and research (the results of which should be circulated among CRE members and relevant international organizations);
- the teaching of environmental law, economics and health, and related research in these areas;
- the development of a core curriculum in these areas;
- the design of short, intensive, problem-oriented courses for the universities and industry in a particular region on a particular topic;
- the organization of occasional symposia and conferences on environmental issues;
- topic-oriented research (e.g. urban traffic problems);
- region-oriented research (e.g. the pollution of the Baltic Sea);
- a study of the harmonization of legal and industrial norms in Europe as a whole;
- the setting up of a Coordinating Committee consisting of 4 rectors and 4 outside representatives, whose task will be to draw up a Plan of Action, to channel information, and to stress the pan-European dimension of **Project Copernicus**.

As a *follow-up to the Catania meeting*, a framework programme of activities would thus be proposed for the next 2 years, to be submitted to CRE members and potential donors. It was decided that the Round Table documents would be published in CRE-action No. 86 (1989/2) and in the Unesco series entitled "Papers on Higher Education", No. 32.

AB/AP Geneva, June 1989

V. Round Table Agenda

PROJECT COPERNICUS

Draft Agenda

1. Presentation of the Position Paper
2. Viewpoint of Environmentalists: Key themes
3. Viewpoint of Industrialists: Key themes
4. Viewpoint of Decision-makers: e.g. politicians
5. Identification of specific approach(es) for Project Copernicus:
 - e.g. - The inclusion of the environmental dimension in university studies versus specialization in environmental topics;
 - the development of this environmental dimension inside the university curriculum;
 - case studies.
6. Proposals for a Work Plan
7. Proposals for the Feasibility Study
8. Role of International Organizations

VI. List of Participants



TABLE RONDE UNESCO-CRE

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Genève, le 30 mars 1989

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(68448) CALL NO: 572.02(07) UNI.

Current issues in environmental education, 1975: selected papers

Marlett, Robert. Columbus, Ohio, ERIC Center for Science, Mathematics, and Environmental education, Ohio State University, 1975. 113 p. (eng). Incl. bibl. // ERIC Information Analysis Center for Science, Mathematics and Environmental Education (USA) // National Association for Environmental Education (USA) // National Association for Environmental Education, 4th annual conference, New Orleans, USA, 1975

KEYWORDS: environmental education; USA - higher education; educational programmes; curriculum development; educational goals; inservice teacher education; community education; teaching materials; environmental planning.

(22595) CALL NO: 572.02(07)(73) CUR. ACCESSION NO: 727/76.

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Emmelin, Lars. Bucharest, European Centre for Higher Education, 1984. p. 11-19. (Higher education in Europe; IX, 3) (eng; also in fre). Incl. bibl. // European Centre for Higher Education (Romania) // L'Ecologie comme discipline dans l'enseignement superieur considere dans la perspective de l'an 2000

KEYWORDS: higher education; environmental education; educational priority areas; ecology; educational forecasting - environmental quality; teacher role.

(63016)

Education in environmental chemistry

Bugenyi, F.W.B.. 1978. p. 15-18. (Bulletin of the Regional Office for Science and Technology for Africa; XIII, 3) (eng; also in fre). // Unesco Regional Office for Science and Technology for Africa (Kenya) // L'Education dans le domaine de la chimie de l'environnement

KEYWORDS: environmental education; chemistry education; higher education; chemical effects; Africa.

(41322)

EE activities in the USSR

1979. p. 4-5. (Connect; Unesco-UNEP environmental education newsletter; IV, 1) (eng; also in ara, fre, rus, spa). // Les Activites d'education relative a l'environnement en URSS // Actividades de EA en la Union Sovietica

KEYWORDS: environmental education; USSR - preprimary education; primary education; secondary education; technical and

vocational education; higher education; mass media.

// Unesco/UNEP International Environmental Education
Programme
(42870)

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Baez, Albert V.; Knamiller, G.W.; Smyth, J.C.. Oxford, Eng., Pergamon Press, 1987. 430 p., illus. (eng). (Science and technology education and future human needs, v. 8). "Papers from the Bangalore Conference on Science and Technology Education and Future Human Needs, held in Bangalore, India in 1985". Incl. bibl. // International Council of Scientific Unions. Committee on the Teaching of Science // Conference on Science and Technology Education and Future Human Needs, Bangalore, India, 1985

KEYWORDS: science education; environmental education; environmental conservation; engineering education; teaching strategies - primary education; secondary education; higher education; curriculum development; agricultural education; resources management; school community relationship; wildlife protection; public information; ethics; public health; water resources; nonformal education; audiovisual instruction; educational games; case studies; developing countries; India; Pakistan; Caribbean; Bangladesh; Papua New Guinea; UK; Venezuela; Argentina; China; USSR.

(77089) CALL NO: 572.02(07) ENV. ACCESSION NO:
HB9525/ED/SDI. ISBN: 0-08-033952-2; 0-08-033953-0(pbk).

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Brancher, David M.. Paris, Unesco, 1980. 111 p., illus., 24 cm. (Studies in engineering education; 9) (eng; also in ara, fre, rus, spa). Incl. bibl. // L'Environnement et la formation des ingenieurs // El Medio ambiente y la ensenanza de la ingenieria // Okruzhayushchaya sreda v tekhnicheskoy obuchenii

KEYWORDS: engineering education; environmental education - environmental engineering; appropriate technology; ergonomics; university curriculum.

(39195) CALL NO: 62(07) ENV. ACCESSION NO: 920-1/80(eng); 794-5/82(1982,fre); 1149-50/83(spa); 896/86(ara); 895/86(rus). MICROFICHE: 86m0340 (eng-2mf); 82m0041 (fre-2mf); 83m0144 (spa-2mf); 86m0306 (rus-2mf); 86m0304 (ara-2mf). ISBN: 92-3-101793-4(eng); 92-3-201793-8(fre); 92-3-301793-1(spa); 92-3-401793-5(rus); 92-3-601793-2(ara).

Environmental education

Paris, Unesco, 1980. 69 p. (Educational documentation and information: bulletin of the IBE; 217) (same text in eng, fre, spa). // IBE // Educacion ambiental // Education relative a l'environnement

Issue presenting an annotated bibliography on environmental education; contains 335 entries and updates IBE bulletin no. 200; classified in 15 sections according to principal themes.

KEYWORDS: environmental education; bibliographies - educational goals; international cooperation; regional cooperation; educational policies; preservice teacher education;

inservice teacher education; preprimary education; primary education; secondary education; higher education; out of school education; out of school youth; adult education programmes; teaching methods; teaching materials; evaluation of education.

// Unesco/UNEP International Environmental Education Programme

(43149) ISSN: 0303-3899(eng); 0304-2723(fre); 0250-6904(spa).

Environmental education: a guide to information sources

Stapp, William B.; Liston, Mary Dawn. Detroit, Gale, 1975. 225 p. (eng). (Man and the environmental information guide series, v. 1). Incl. bibl.

KEYWORDS: environmental education; information sources; USA - human ecology; university courses; bibliographies; teaching aids; reference materials; society; institutions; financial resources.

(26020) CALL NO: R 659.2:572.02(73) ENV. ACCESSION NO: 71.343/ED. ISBN: 0-8103-1337-5.

Environmental education: a teacher's guide with inquiry and value seeking strategies

Hamann, Julianna M.; Hunsaker, Don. Rev. ed. Santee, Calif., Jackson Publications, 1973. 269 p., illus. (eng). // Santee School District (USA) // Conference on Environmental Education, Santee, USA, 1970

KEYWORDS: environmental education; educational strategies; primary education; secondary education; higher education; teaching guides - ecology; teaching materials; teaching methods; evaluation methods; information sources; bibliographies.

(28878) CALL NO: 572.02(07)(73) ENV. ACCESSION NO: 71.756/ED.

Environmental education at institutions of higher education

Klika, Eduard; Kvasnickova, Dana. Bucharest, European Centre for Higher Education, 1984. p. 20-28. (Higher education in Europe; IX, 3) (eng; also in fre). // European Centre for Higher Education (Romania) // L'Education relative a l'environnement dans les institutions d'enseignement superieur

KEYWORDS: higher education; environmental education; graduates; educational development; Czechoslovakia.

(63017)

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Emmelin, Lars. Strasbourg, Council of Europe, 1975. 150 p. (eng; also in fre). Incl. bibl. // Council of Europe. Council for Cultural Cooperation // L'Enseignement des problemes de l'environnement au niveau universitaire

KEYWORDS: environmental education; higher education; Europe - educational programmes; teaching methods; educational systems; practicums; university courses; international cooperation.

(15989) CALL NO: 572.02(07)(4) emm. ACCESSION NO: 2453/75(eng); 2454/75(fre).

Environmental education in action

Schoenfeld, Clay; Disinger, John F.. Columbus, Oh., Ohio State University, 1977. 343 p., illus. (eng). Contents: v.1. Case studies of selected public school and public action programs.- v.2. Case studies of environmental studies programs in colleges and universities today. // ERIC Information Analysis Center for Science, Mathematics and Environmental Education (USA) // Ohio State University (USA)

KEYWORDS: environmental education; case studies; USA - community action; educational programmes; out of school education; mass media; curriculum development; educational projects; higher education.

(24832) CALL NO: 572.02(07)(73) ENV. ACCESSION NO: 1351/77(v.1); 1764/78(v.2).

Environmental education in Europe

Cerovsky, Jan. 1972. p. 25-27. (Nature and resources; VIII, 3) (eng; also in fre). // L'Education relative a l'environnement en Europe

KEYWORDS: environmental education; Europe - primary education; secondary education; teacher education; higher education.

(64526)

Environmental education in Japan

1980. p. 4-5. (Connect; Unesco-UNEP environmental education newsletter; V, 2) (eng; also in ara, fre, rus, spa). // Education relative a l'environnement au Japon // La Educacion ambiental en el Japon

KEYWORDS: environmental education; Japan - primary education; secondary education; higher education; educational research; educational television.

(43058)

Environmental education in the Asia and Oceania region

1979. p.1-4. (Connect; Unesco-UNEP environmental education newsletter; IV, 4) (eng; also in ara, fre, rus, spa). // L'Education relative a l'environnement dans la region d'Asie et d'Oceanie // Actividades de educacion ambiental en Asia y Oceania

KEYWORDS: environmental education; Asia; Oceania - role of education; education and development; primary education; secondary education; higher education; integrated curriculum; teacher education.

(42979)

Environmental education in the Nordic countries: Denmark, Finland, Iceland, Norway, Sweden

Copenhagen, Nordic Council of Ministers, 1977. 93 p., illus. (eng). Incl. bibl. // Nordic Council // Secretariat for Nordic Cultural Cooperation

KEYWORDS: environmental education; preprimary education; primary education; secondary education; higher education; technical and vocational education; educational systems; Denmark;

Finland; Iceland; Norway; Sweden - environmental planning; educational environment; teacher education; adult education; leisure time activities; educational cooperation; regional cooperation.

(27113) CALL NO: 572.02(07)(48) ENV. ACCESSION NO: 139/78.

Environmental education: key issues of the future

Oxford, Eng., Pergamon Press, 1977. 82 p., illus. (eng).
"Proceedings of the conference held at the College of Technology, Farnborough, Eng." Incl. bibl.

KEYWORDS: environmental education - recurrent education; teacher education; higher education; school systems; international cooperation.

// Unesco/UNEP International Environmental Education Programme

(38983) CALL NO: 572.02(07)(06) ENV. ACCESSION NO: 76.258/ED. ISBN: 0-08-021490-8.

Environmental education of engineers: current trends and perspectives

Ireland, F.E.; Baker, R.. 6 Aug. 1979. 51 p. (eng; also in fre). Incl. bibl.

KEYWORDS: environmental education; engineers; environmental engineering; engineering education - systems analysis; learning methods; university curriculum; postgraduate courses; masters degrees; curriculum development; Brazil; Colombia; France; Philippines; Venezuela; Peru; UK; Japan; Mexico; Switzerland; USA; Netherlands; Hungary; India; Kenya.

// Unesco/UNEP International Programme on Environmental Education and Training of Engineers

(37402) DOC CODE: SC.79/WS/21. MICROFICHE: 80s0231 (eng-lmf; fre-lmf).

Environmental education; principles and practice

Carson, Sean McBirney. London, Arnold, 1978. 258 p., illus. (eng). Incl. bibl.

KEYWORDS: environmental education; human ecology; UK - science and technology; geography; history; primary education; secondary education; higher education; teacher education curriculum; university courses.

(29350) CALL NO: 572.02(07)(410) ENV. ACCESSION NO: 72.624/ED; 76.260/ED; 73.018/ED. ISBN: 0-7131-0133-4.

Environmental engineering education in Africa

Grigoriev, A.. 1978. p. 20-23. (Bulletin of the Regional Office for Science and Technology for Africa; XIII, 1) (eng; also in fre). // Unesco Regional Office for Science and Technology for Africa (Kenya) // L'Education des ingenieurs en matiere d'environnement en Afrique

KEYWORDS: environmental education; engineering education; higher education; curriculum development; Africa; Kenya - training courses; pilot projects.

(41319)

Etudes francaises sur les rejets thermiques des centrales
electriques; rapport d'enquete

Dezes-Cadiere, H.. Paris, Association francaise pour l'etude des
eaux, 1976. 186 p., maps. (fre). // Association francaise
pour l'etude des eaux // France. Service des problemes de l'eau

KEYWORDS: water pollution; electric power stations;
environmental control; France - waste disposal and handling; heat
transfer; cooling systems; refrigeration engineering;
thermodynamics; quality of water; aquatic ecosystems; waste heat
recovery; research projects; research centres; laboratories;
university institutes; research workers; professional
associations; information sources; bibliographies.

(23828) CALL NO: 628.515(44) DEZ. ACCESSION NO: 70.585/SC.

European Working Conference on Environmental Conservation Education,
Zurich, Switzerland, 1971

Final report. Cerovsky, Jan; Withrington, David K.J.. Morges,
Switzerland, IUCN, 1972. 58, 14 p. (eng). (IUCN publications
new series. Suppl. paper 34). // International Union for
Conservation of Nature and Natural Resources

KEYWORDS: Meeting report on: environmental education; Europe -
primary school curriculum; secondary school curriculum;
university curriculum; teacher education curriculum; out of
school education; youth activities.

(19033) CALL NO: 572.02(07)(06) EUR. ACCESSION NO:
ARC/UIC/12/34; 71.768/ED.

Further follow-up to the Tbilisi Conference

1978. p. 5-6. (Connect; Unesco-UNEP environmental education
newsletter; III, 4) (eng; also in ara, fre, rus, spa). //
Autres prolongements de la Conference de Tbilissi // Otras
actividades consecutivas a la Conferencia de Tbilisi

KEYWORDS: environmental education; Poland; Czechoslovakia;
West Africa - universities; role of education; educational
cooperation; teaching methods.

// Seminar on University, Environment and Society, Warsaw,
1978

(42961)

Higher education and environmental education in light of the results
and recommendations of the Tbilisi Conference

Kolybine, Victor. 1979. p. 10-14. (Higher education in Europe;
IV, 1) (eng; also in fre, rus; abstr. in eng, fre, rus). //
European Centre for Higher Education (Romania) // L'Enseignement
superieur et l'education relative a l'environnement a la lumiere
des resultats et recommandations de la Conference de Tbilissi //
Vysshee obrazovanie i obrazovanie v oblasti okruzhayushchej sredy
v svete rezul'tatov i rekomendachij tbilisskoj konferentsii

KEYWORDS: higher education; environmental education -
environmental conservation; interdisciplinary approach;
educational personnel training; educational cooperation.

(42523)

Higher education and the environment: the situation in the Federal Republic of Germany; a review

Lob, Reinhold E.. Bucharest, European Centre for Higher Education, 1984. p. 24-33, illus. (Higher education in Europe; IX, 3) (eng; also in fre). Incl. bibl. // European Centre for Higher Education (Romania) // L'Enseignement superieur et l'environnement: la situation en Republique Federale d'Allemagne; vue d'ensemble

KEYWORDS: higher education; environmental education; teacher education; training courses; university courses; geography education; Germany FR.

(63019)

How higher education meets new requirements: human ecology

Pillet, Gonzague. Bucharest, European Centre for Higher Education, 1982. p 18-22. (Higher education in Europe; VII, 3/4) (eng; also in fre, rus). Incl. bibl. // European Centre for Higher Education (Romania) // Reponse apportee par l'enseignement superieur a de nouvelles exigences: l'ecologie humaine

KEYWORDS: higher education; human ecology; environmental education; Western Europe - degrees (academic); educational trends; science popularization; epistemology.

(53889)

Insights into environmental education

Martin, George C.; Wheeler, Keith. Edinburgh, Oliver & Boyd, 1975. 199 p. (eng). Incl. bibl.

KEYWORDS: environmental education; secondary education; higher education - conservation of nature; architecture education; human ecology; UK; Australia; USA.

// International Union for Conservation of Nature and Natural Resources

(18378) CALL NO: 572.02(07) mar. ACCESSION NO: 67.798/ED; 71.760/ED. ISBN: 0-05-002799-9; 0-05-002798-0(paperback).

The Integration of teaching on environmental problems

Moss, R.P.. 1986. p. 75-96, illus. (Universities and environmental education) (eng). // International Association of Universities // Seminar on the Role of the University in Environmental Education, Budapest, 1983

KEYWORDS: environmental education; higher education; university curriculum; integrated curriculum; educational models - teaching strategies; environmental sciences; role of education; environmental perception.

(68449) CALL NO: 572.02(07) UNI.

Interdisciplinarity and environmental education

Moroni, Antonio. 1978. p. 480-494, illus. (Prospects: quarterly review of education; VIII, 4) (eng; also in fre, spa). Incl. bibl. // Interdisciplinarite en education environnementale // Interdisciplinaridad en la educacion ambiental

KEYWORDS: environmental education; interdisciplinary

approach; environmental deterioration; ecological conditions;
primary school curriculum; secondary school curriculum;
university courses; interdisciplinary research; lifelong
education; teaching materials.

(30311)

Intergovernmental Conference on Environmental Education:
recommendations and guiding principles for the role of
environmental education in higher education institutions

1979. p. 5-9. (Higher education in Europe; IV, 1) (eng; also
in fre, rus; abstr. in eng, fre, rus). // European Centre for
Higher Education (Romania) // Conference intergouvernementale sur
l'education a l'environnement: recommandations et orientations
sur le role de l'education relative a l'environnement dans les
institutions d'enseignement superieur // Mezhpriavitel'stvennaya
konferentsiya po obrazovaniyu v oblasti okruzhayushchej sredy:
rekomentatsii i rukovodyashchie printsipy o roli obrazovaniya v
oblasti okruzhayushchej sredy v vysshikh uchebnykh zavedeniayah

KEYWORDS: environmental education; higher education;
educational institutions; role of education; Europe.

// Intergovernmental Conference on Environmental Education,
Tbilisi, USSR, 1977 // Declaration of the Tbilisi
Intergovernmental Conference on Environmental Education
(42521)

Intergovernmental Conference on Environmental Education, Tbilisi,
USSR, 1977

Environmental education in Sweden. Stockholm, Swedish Ministry
of Education and Cultural Affairs, 1978. 83 p. (eng). "Report
from the Swedish Preparatory Committee for Unesco's
Intergovernmental Conference..." // Sweden. Ministry of
Education and Cultural Affairs

KEYWORDS: environmental education; environmental planning;
Sweden - educational goals; environmental planning; working
conditions; primary school curriculum; secondary school
curriculum; university curriculum; teacher education curriculum;
higher technical education; educational associations;
comprehensive schools; educational reform; higher education;
adult education.

(32395) CALL NO: 572.02(07)(485) ENV. ACCESSION NO:
243/79.

International Multidisciplinary Working Group on Environmental
Education and Training of Engineers, 2nd, Caracas, 1977

Informe final. Montevideo, Unesco Regional Office for Science
and Technology in Latin America and the Caribbean, 1978. 197 p.,
illus., 26 cm. (spa). Incl. bibl. // Unesco Regional Office
for Science and Technology for Latin America and the Caribbean
(Uruguay)

KEYWORDS: environmental education; professional training;
engineering education; engineers; developing countries -
university curriculum; human environment; working conditions;
ergonomics; safety education; environmental management;
appropriate technology; interdisciplinary approach; postgraduate
courses; Czechoslovakia; Spain; USA; Philippines; Venezuela;

Thailand.

(36762) CALL NO: 572.02(07) INT. ACCESSION NO: 296-7/80(spa). MICROFICHE: 84m0457 (spa-3mf). ISBN: 92-3-301-544-0.

International seminar on interdisciplinary pre-university
environmental education

1981. p. 2. (Connect; Unesco-UNEP environmental education newsletter; VI, 3) (eng; also in ara, fre, rus, spa). // Seminaire international sur l'education relative a l'environnement interdisciplinaire pre-universitaire // Seminario internacional sobre el caracter interdisciplinario de la educacion ambiental preuniversitario

KEYWORDS: environmental education; higher education; interdisciplinary approach - educational systems; educational innovations; curriculum development; social sciences; environmental training.

// International Seminar on Interdisciplinary Pre-University Environmental Education, Budapest, 1980 (47033)

International Workshop on Environmental Education, Belgrade, 1975

Environmental education at the tertiary level for general students. Cook, Robert S.; Weidner, Edward W.. Oct. 1975. (15 p. in various pagings). (eng; also in fre, spa). Incl. bibl. // UNEP

Meeting paper tracing the development of environmental education in higher education since 1960 and describing university courses offered - outlines the work of CERI-OECD in this field; considers the educational needs of general tertiary-level students and includes guidelines on the implementation of environmental studies programmes within the educational programmes of higher institutions.

KEYWORDS: environmental education; higher education; university courses - educational needs; educational programmes.

// OECD. Centre for Educational Research and Innovation // Unesco/UNEP International Environmental Education Programme (16215) DOC CODE: ED.75/CONF.001/6; ED.75/CONF.001/COL.4. MICROFICHE: 76s0328.

Environmental education programme for adults. Emmelin, Lars. Oct. 1975. (14 p. in various pagings). (eng; also in fre, spa). Incl. bibl. // UNEP

Meeting paper on environmental education as part of adult education programmes - discusses the nature of the target population and the need for the dissemination of information on environmental matters; examines the limited educational role of the mass media in this field; mentions university-originating adult education programmes in environmental problems and recommends a coordination of educational development efforts of agencies responsible for environmental control.

KEYWORDS: environmental education; adult education programmes - dissemination of information; mass media; universities; educational development; environmental control.

// Unesco/UNEP International Environmental Education Programme

(16210) DOC CODE: ED.75/CONF.001/9; ED.75/CONF.001/COL.5.
MICROFICHE: 76s0323.

Environmental studies for specialists in non-environmental fields. Maldague, Michel E.. Oct. 1975. (19 p. in various pagings). (eng; also in fre, spa). Incl. bibl. // UNEP

Meeting paper on environmental education for specialists in non-environmental fields, on a level of higher education - examines types of professional personnel involved in environmental control and advocates an intensification of the training of specialists in basic environmental sciences; discusses possible curriculum development and life-long education in environmental studies for students following other branches of professional training.

KEYWORDS: environmental education; higher education - environmental control; curriculum development; lifelong education; professional training.

// Unesco/UNEP International Environmental Education Programme

(16213) DOC CODE: ED.75/CONF.001/8; ED.75/CONF.001/COL.8.
MICROFICHE: 76s0326.

Learning through independent study: the environment and the citizen

Stapp, William B.; Swan, James A.. Ann Arbor, University of Michigan, Dept of Independent Study, Extension Service, 1973. 14 v., illus. (eng). (Natural resources 485 & 486). Incl. bibl. // University of Michigan (USA). Dept of Independent Study // University of Michigan (USA). School of Natural Resources

KEYWORDS: environmental education; self instruction; USA - human ecology; human activities effects; natural resources; environmental control; university courses.

(13200) CALL NO: 572.02(07)(73) lea. ACCESSION NO:
65.385/ED.

Limits to growth: a challenge to higher education

Meadows, Dennis H.; Perelman, Lewis J.. 1977. p. 33-43. (Prospects: quarterly review of education; VII, 1) (eng; also in fre). Incl. bibl. // Les Limites de la croissance: un defi pour l'enseignement superieur

KEYWORDS: higher education; future society; educational reform; university curriculum; educational philosophy; economic growth; environmental education; ecology; learning processes; environmental changes; basic needs.

// "The Limits to growth"
(22732)

Meeting of Experts on Environmental Aspects of Engineering Education and Training, Paris, 1974

Conception for study of environment changing by man and training specialists in the Soviet Union. Ryabchikov, A.M.; Bondarenko, I.I.. 1974. 7 p. (eng).

Meeting paper on environmental education in the USSR in view of human activities effects on pollution, natural resources and the environmental quality in general - Discusses measures and expenditures for environmental control; considers changes in

curriculum development in higher technical and university curriculum for engineering education.

KEYWORDS: environmental education; USSR; human activities effects; pollution; natural resources; environmental quality - environmental control; curriculum development; university curriculum; engineering education.

// UNEP

(11747) DOC CODE: SC.74/CONF.614; STD/1736/1906.

MICROFICHE: 75s0259.

Considerations on the organization of training in environmental engineering. Juda, Jan H.. 13 June 1974. (38 p. in various pagings). (eng; also in fre). In cooperation with the UNEP. Incl. bibl.

Meeting paper on environmental education with reference to environmental engineering - Discusses necessary university curriculum and post-graduate courses in engineering education; refers to environmental engineering as related to systems analysis; deals with protection of the entire human environment, making special mention of public health; briefly examines questions of teaching personnel, equipment and teaching methods; includes both current teaching programmes of various educational institutions and technological institutes and proposed teaching programmes.

KEYWORDS: environmental education; environmental engineering - university curriculum; postgraduate courses; engineering education; systems analysis; human environment; public health; educational institutions; technological institutes.

// UNEP

(09327) DOC CODE: SC.74/CONF.614/7; SC.74/CONF.614/COL.6.

MICROFICHE: 74s0688.

Engineering education and the environment. Mostertman, L.J.. 14 June 1974. 8 p. (eng). In cooperation with the UNEP.

Meeting paper on the need to include environmental education in the university curriculum for engineering education - Refers to the place of systems analysis in the environmental engineering for the protection of the human environment.

KEYWORDS: environmental education; university curriculum; engineering education - systems analysis; environmental engineering; human environment.

// UNEP

(09323) DOC CODE: SC.74/CONF.614/COL.7. MICROFICHE:

74s0684.

Environmental concerns and their implications for education. Okun, Daniel A.. 14 June 1974. (31 p. in various pagings). (eng; also in fre). In cooperation with the UNEP. Incl. bibl.

Meeting paper on the need for environmental education both for industrial society and for developing countries - Describes special problems of infectious disease, public health and population problems in countries of rapid urbanization; deals with environmental engineering and engineering education as related to manpower needs, with special mention of the social responsibility of the engineer; considers university curriculum in related subjects.

KEYWORDS: environmental education; industrial societies; developing countries - infectious diseases; public health;

population problems; urbanization; environmental engineering; engineering education; manpower needs; social responsibility; engineers; university curriculum.

// UNEP

(09326) DOC CODE: SC.74/CONF.614/6; SC.74/CONF.614/COL.5.
MICROFICHE: 74s0687.

Environmental education in India. Ramachandran, A.; Bhattacharya, R.N.. 1974. (12 p. in various pagings). (eng).

Meeting paper on educational reform in environmental education in India in view of new educational needs - Discusses changes in university curriculum so as to include environmental engineering in engineering education; refers to the study of environmental sciences on other educational levels as well; lists post-graduate courses related to these subjects, with special mention of sanitary engineering.

KEYWORDS: educational reform; environmental education; India; educational needs - university curriculum; environmental engineering; engineering education; environmental sciences; postgraduate courses; sanitary engineering.

// UNEP

(11804) DOC CODE: SC.74/CONF.614; STD/1737/1906.
MICROFICHE: 75s0258.

Final report. Oct. 1974. 113 p., illus. (eng; also in fre, spa). Incl. bibl.

Meeting report on educational reform in engineering education so as to include environmental education in university curriculum - Considers human activities effects on environmental quality and the resulting manpower needs in the field of environmental engineering; examines the importance of life-long education for engineers and lists various educational programmes available such as workshops, seminars, post-graduate courses, in-service training, etc.; stresses the importance of international cooperation in this area and includes the agenda of the meeting as well as papers and addresses delivered.

KEYWORDS: educational reform; engineering education; environmental education; university curriculum - human activities effects; environmental quality; manpower needs; environmental engineering; lifelong education; educational programmes; international cooperation.

// UNEP

(11749) CALL NO: 62(07) mee. ACCESSION NO: Doc. in Lib.
(638/75(eng); 639/75(fre)). DOC CODE: SC.74/CONF.614/COL.8.
MICROFICHE: 75s0265.

Meeting on the Implementation of the Recommendations of the Third Regional Conference of Ministers of Education and Ministers Responsible for Economic Planning in the Arab States, Cairo, 1976

Selected resolutions and recommendations of recent conferences and meetings of relevance to topics likely to be discussed at the meeting. 17 Sept. 1976. 25 p. (eng; also in fre).

Meeting paper presenting selected recommendations of various Unesco conferences to implement decisions made in 1976 for linking education and development in the Arab States; discusses the development of science and technology, stressing the relation between science and development; also examines university

cooperation in Africa and the importance of the teacher role and different forms of teacher training; mentions priority action for the twenty-five least developed countries and provides recommendations from the Belgrade Workshop on environmental education; deals briefly with cultural policy and educational development in Africa and training for higher technical personnel; refers to sport and physical education and reviews the role of education in rural development.

KEYWORDS: education and development; Arab Countries; science and technology; science and development; university cooperation; Africa; teacher role; teacher education; least developed countries; environmental education; cultural policy; educational development; higher technical personnel; sport; physical education; role of education; rural development.

// Regional Conference of Ministers of Education and Ministers Responsible for Economic Planning in the Arab States, 3rd, Marrakesh, Morocco, 1970

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KEYWORDS: human rights education; cultural identity; refugee education; liberation movements; peace education; international understanding; womens rights; women and development; population education; educational policies; educational planning; educational administration; teaching methods; educational information; special education; handicapped; youth; educational personnel training; science education; technical and vocational education; environmental education; higher education; adult education; illiteracy; rural development; integrated development; educational discrimination; international instruments.

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